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## Table of Contents.

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ORIGINAL ARTICLES—		Page.	ABSTRACTS FROM MEDICAL LITERATURE—		Page.
The Beattie-Smith Lectures—The Psychological Reactions of Soldiers, by A. J. M. Sinclair ..	261		Physiology ..	284	
Hypertensive States in Pregnancy, by Richmond Jeremy ..	270		Biochemistry ..	285	
Hypertension and Allied Conditions in Pregnancy, by R. F. Back ..	272		<b>BRITISH MEDICAL ASSOCIATION NEWS—</b>		
Clinical Aspects of Oral Bacteriology, by A. B. P. Amies, D.D.Sc., F.R.A.C.S.(L.O.), F.R.S.E. ..	275		Scientific ..	286	
			Notice ..	288	
			<b>MEDICAL SOCIETIES—</b>		
			Melbourne Paediatric Society ..	288	
			<b>POST-GRADUATE WORK—</b>		
			Clinico-Pathological Demonstrations in Neurology in Melbourne ..	290	
			<b>CORRESPONDENCE—</b>		
			The Use of Trichlorethylene in Anaesthesia ..	290	
			Repatriation Department and Ex-Service Personnel ..	290	
			Poverty, Housing and Health ..	291	
			<b>HONOURS—</b>		
			The Venerable Order of the Hospital of Saint John of Jerusalem ..	291	
			<b>NAVAL, MILITARY AND AIR FORCE—</b>		
			Appointments ..	291	
			Casualties ..	292	
			<b>NOMINATIONS AND ELECTIONS ..</b>		
			<b>MEDICAL APPOINTMENTS ..</b>		
			<b>DIARY FOR THE MONTH ..</b>		
			<b>MEDICAL APPOINTMENTS: IMPORTANT NOTICE ..</b>		
			<b>EDITORIAL NOTICES ..</b>		

### The Beattie-Smith Lectures.<sup>1</sup>

(University of Melbourne.)

#### THE PSYCHOLOGICAL REACTIONS OF SOLDIERS.

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#### LECTURE II.

##### The Type of Campaign.

Now that the general aspects of front-line warfare have been dealt with, it may be noted that there are features peculiar to each campaign, depending on the actual nature of the war setting in each campaign. At least, this has been so in my experience, which includes work in a forward area, in the Tobruk garrison, and later in a hospital in New Guinea in a fairly forward area. It may be worth while, then, to contrast the environmental features peculiar to these two areas.

As you are aware, the Tobruk garrison was invested by German and Italian troops for a period of approximately nine months, and there were certain elements in the psychology of the troops under this siege which are worth mentioning. The physical and emotional isolation of men cut off from the rest of a force in this manner is emphasized. This isolation occurred at a time when it seemed probable that the fortunes of war were moving against the allied forces, and there was a feeling in this isolation that theirs was an individual experience not related closely to the main momentum of the war effort,

and therefore partaking of none of the advantages of the support which comes to a large body of men all intimately involved in the same struggle.

Again, in an area where information was scarce and communications were poor, rumour and counter-rumour became daily topics of conversation and spread with fantastic rapidity. All these rumours were highly charged with either excited anticipation or tense apprehension. Unfulfilled wishes became metamorphosed overnight into stories of allied counter-attacks, of assistance coming from Alexandria or of the expected arrival of large numbers of troops and armour. On the other hand, apprehension materialized into rumours of heavy casualties, of enemy infiltrations and of large projected enemy air attacks. This psychological situation occurred in a setting of extreme physical discomfort, boredom, vermin, dust, heat, uninteresting food and shortage of water. Physical activity in the daytime was limited to digging positions under cover or to defensive work in the wait for the onset of darkness.

The men were accommodated for the most part in lightly constructed slit trenches and caves which were often vermin infested. There were few recreational facilities, and reading material was scarce. Dive-bombing and high-level bombing attacks were numerous, and were concentrated on the town over a small area which surrounded the harbour. These attacks were associated with all the noise and other frightful stimuli that go with dive-bombing. In the early days there was no aerial support, although increasing anti-aircraft defence was developed.

It is interesting to note how these various factors were countered by the shrewd students of siege psychology. Quickly it was arranged that a bi-weekly mail service should come by destroyer from Alexandria. The tension of defensive fighting was relieved by the organization of many fighting patrols, which were both tactically and offensively a useful outlet for suppressed feelings of aggression. By

<sup>1</sup> Delivered at Melbourne on November 22 and 29, 1944.

the institution of a daily local news sheet, reliable information was provided to take the place of rumours. The food was improved, and fresh meat and even live sheep were brought to the area by destroyer at great risk.

The importance of retaliative action as a means of releasing anxiety was shown prominently during air raids, when men would grasp any weapon, however ineffective, in an attempt to damage low-flying aircraft, often verbally expressing immense relief when they entered the struggle against diving aircraft even though they were armed only with rifles. The increasing efficiency of anti-aircraft defence with a mounting score of destroyed enemy machines did much to counter the feeling that the soldier was a defenceless quarry without a chance of hitting back. Gradually the viewpoint changed, and the improvement in morale is well illustrated by the words of an anti-aircraft gunner, who said: "They're just like bloody ducks anyway."

The siege atmosphere invokes also useful psychological mechanisms. The most prominent of these is a compensatory stimulus which comes to men who are occupied in the defence of a situation from which they know they cannot escape. Such a situation brings with it a strong feeling of mutual comradeship, not always present under conditions of more diffused fighting. Most of the men in the area gained some inspiration from the knowledge that they were comrades in arms in a common trial of resistance.

In the New Guinea campaign there were present stimuli of a different type—stimuli especially characteristic of jungle fighting. Of first importance was the tremendous demand made on physical endurance. In the early stages, advance to the front line was over the Kokoda trail, which wound its dreadful way over back-breaking, seemingly endless mountain ranges. The men made their way in single file through endless mud under the constant drizzle of tropical rain. The day's march was on the "rendezvous" principle, as all organized marching was impracticable, with the result that the advantages of mass marching, which provides a stimulus to the man who is flagging, were lost. Progress became a matter of individual endurance. At the end of the terrible trail, weary men were confronted with a new, strange type of warfare. There was no "line", no forward or rear position. Seldom was there a large aggregation of the enemy to engage in one position; seldom indeed could he ever be seen. He was an invisible menace behind a moving curtain of leaves and shadows. The detection of sound and movement became a factor of prime biological importance. Warfare was a struggle, not of units, but of individuals. The momentum imparted by concerted attack was absent. Such conditions called for a display of cunning, of personal aggressiveness and of courage of the highest order. Most of the men quickly proved that they possessed these qualities; but a few, whose success as soldiers depended upon the momentum of the herd, developed as a result of these conditions, serious and sometimes incapacitating mental difficulties.

#### The Effects of Evacuation to a Base Area.

Let us assume now that the soldier is removed from front-line action, and that he returns to a base area. Here, he may be resting or engaged in retraining and regrouping. He may, on the other hand, be in hospital—ill or wounded. In either case, return to a base area brings immediate relief to this weary, over-stimulated man. Many suffering from normal fear states quickly recover their stability. Those who are struggling with fear reactions, but who carried on until evacuated wounded or sick, are often very well in hospital because they have achieved an honourable escape from an almost intolerable dilemma, wearing the badge of a physical rather than of an emotional disability.

However, the line of evacuation is not a panacea for all psychological ills. In the first place, the soldier is returned to base emotionally over-charged or sensitized. By this is meant he is now conditioned to noises and the effects of other frightful stimuli, so that fear reactions can now be reinvoked in all their former intensity by other noises, by a sight, by a reminiscence or by the recounting of a battle tale. He may also retain the horror of the battle field in brilliant and terrifying dreams.

It is difficult to be certain of the exact mechanism responsible for this condition of fear or anxiety in men of previously good personality after their return from the scene of battle action. It may be due to the presence of a pathological state of continuing neural excitation. It may be that in these cases there exists a state of facility in the diencephalic mechanisms which control sympathetic nervous system outflow. In this respect, it has been shown experimentally by Grinker that the hypothalamus acts like a condenser discharging repeated bursts of excitation, which may influence cortical activity long after the cessation of the original stimulus. This, then, may serve to explain why external stimuli such as loud noises may result in sympathetic outbursts long after the individual is removed from the field of battle. This mechanism, which was originally biologically relevant, has now become pathological, because the reaction is now inappropriate to the reality.

Other factors also are operative during the change from front line to base area, which contribute to continuous neurotic exacerbations or even to the initial development of states of anxiety. The bolstering effect of exciting stimuli has been lost. Now comes a period of reflection. The soldier, who has carried on whilst in the line without exhibiting outwardly any evidence of conflict, may decide, consciously or unconsciously, that he may be unable to face return to a similar stressful situation. If he is wounded or ill, it may be possible for him to defer facing this painful prospect until the protective badge of physical disability is plucked from him and he is ready for discharge back to his unit. It is at this time that he may fashion for himself a similar badge, woven, however, of different material. He now exteriorizes his latent anxiety in the form of physical symptoms of disability. He may show, therefore, for the first time, headache, dyspnoea, palpitation, subjective sensations related to the gastro-intestinal tract, or some other of the somatic equivalents of anxiety. This process may be entirely unconscious. Of course, it may be reinforced by a conscious elaboration; but this, after all, is a very common human tendency during any physical illness.

Again, we must remember that the soldier, who during training and in action is carried beyond the consideration of the importance of his own personal concerns and individual aims by the group momentum of war, may again change in his attitude when he reaches a base area. Here there is greater opportunity for personal thinking and personal planning. The concept of national insecurity does not seem so tangible now. The urgency of the common purpose pales before the pressure of personal concern. His family and domestic worries now assume prominence. Matters of family health and welfare begin to worry him. There is growing awareness of personal ties and perhaps of financial sacrifice involved in serving in the army. Letters from home reinforce the growing awareness of long-standing sex deprivation. These, together with the countless personal problems, intrude more and more on his consciousness. He may look about him and notice now his own maladjustment in his unit. Perhaps he has been passed over for promotion and is resentful. The idiosyncrasies of people about him begin to irritate him. He finds that a large number of men are being released from service on medical, compassionate or manpower grounds. Why should he not be one of them? His army job may now closely resemble his civilian job, but the amenities of civilian existence are missing. He is subjected to the restrictions of military service without its beneficial stimuli. His work and life are controlled by military law, whilst the work of his non-military, but equally militant, confrères at home is interrupted and governed by industrial strife. Little wonder, then, that in men whose sense of national idealism is waning, the emphasis on the present group struggle gives way now to an emphasis on individual problems.

#### The Soldier and his Adjustment.

We have now encompassed, in brief, what may be termed the psychological state which obtains in the various theatres of warfare, and have pointed out that the mental

health of the soldier depends on his ability to adjust the various contingencies in these theatres. How many men do actually fail in this task of adjustment and become psychiatric casualties? Does the war lead to more neurotic and psychotic breakdowns than occur normally in a population not at war? These are perhaps two of the most important questions emerging from a study of war psychology. They are difficult questions to answer for two reasons. In the first place we have never been able to assess accurately the normal incidence of neurosis in the civil population. Secondly, we find that figures for neurosis in the army are obviously much lower than the actual incidence. The reason for this is that army statistics for neurosis admit only, in general, figures for overt neurosis, and do not include the many cases of neurosis which are masked by a frankly somatic guise—such guises as chronic dyspepsia, eye strain, flat feet, varicose veins. When soldiers with this type of complaint are carefully examined, one frequently discovers a substantial state of neuroticism associated with the symptoms of bodily disorder, and it is this state of neuroticism which is the incapacitating element of the illness. There are also cases in which a minimal stated physical disability becomes a total disability because of the addition of psychological elements to the illness. As examples of such comparatively minor physical ailments, one might mention bronchitis, sinusitis, fibrositis, painful wound scars.

However, let us compare the stated incidences of neurosis in civil and in military life so far as these can be determined. British and American figures suggest that between 11 and 50 individuals per 1,000 of the normal population show evidence of overt neurotic disorder requiring medical attention. The rate for the army between January, 1943, and January, 1944, was seven per 1,000 of all soldiers in the south-west Pacific area. The latter figure, it might be argued, is much lower than the true figure, and it must be admitted in this respect that of all men discharged from the army as medically unfit, at least 50% have, in fact, a predominantly psychological disability. This does not prove, however, that war produces any more neurosis than occurs in civilian life. Indeed, I feel sure that this ratio of predominantly psychological to predominantly physical illness is not far short of that which obtains in the out-patient clinics of most civilian hospitals.

What is the rate of neurotic casualties compared with that of other casualties in war time? Here again one must accept the figures with reservation, because for reasons stated, the figures for physical illness really include many true cases of psychological disorder. The figures for the Middle East campaign between 1940 and 1942 show that of all reported illnesses requiring admission of the patient to hospital, battle casualties comprised 4%, physical illnesses 93.6%, neurotic illnesses 2.4%, and psychotic illness 0.1%. These figures cover many thousands of hospital admissions. A much smaller series of figures collected from my own cases is in general agreement with those official figures. In the New Guinea campaign, in my own experience, the percentage of neurotic and psychiatric casualties admitted to one hospital over a period of five months was 2.1.

What is the position with regard to insanity occurring in soldiers as compared with the incidence of insanity in civil life? Here again we must accept statistics with proper reservation. Figures taken from an examination of all our forces engaged in the South-West Pacific campaign from January, 1943, to June, 1944, show an over-all rate for psychosis, mental defect excluded, of 0.94 per 1,000.

For the purpose of making some sort of comparison with the rate in civilians, I have compared this figure with the percentage of certified persons, mental defectives excluded, admitted to mental hospitals in Victoria over a period of one year (1941). The figure for the incidence of certifiable psychosis in Victoria is 0.06 per 1,000 in that age group which corresponds to the age group in the services—namely, twenty to thirty-five years.

The higher army figure of 0.94 per 1,000 may be said to include nearly all cases of psychosis actually occurring in the services, because one must remember that all soldiers who show even slight evidence of psychotic behaviour are quickly detected and sent to hospital. On the other hand,

it is a fair generalization that in civil life there are as many psychotic persons outside mental hospitals as there are inside, simply because their malady is not sufficiently severe to require certification and they are able to be cared for by their relatives.

We may safely say, then, that the rate may be more truly held to be 0.12 per 1,000 for civilians as compared with 0.94 per 1,000 for soldiers. The rate of psychosis still appears higher in the army, but not so much higher as to suggest that war service is a strong cause of psychotic breakdown. Moreover, when we come to examine the type of psychotic breakdown in the service, we see that on the whole it is more superficial and more transient than that which commonly occurs in civilians.

#### Types of Nervous Disorder among Servicemen.

We have now examined the setting in which psychological disorder occurs in war time, and have indicated in a general way, as far as statistics will tell, the incidence of nervous and mental illness. I shall now discuss the various types of nervous disorder which occur among servicemen, their incidence and their character, indicating any features which seem peculiar to mental breakdown under service conditions, in contrast to similar peace-time conditions. In this connexion I shall at times make use of figures and percentages in estimating the significant factors found on examination of a group of psychiatric casualties. These figures are taken from a study of approximately 2,500 patients seen in the following spheres of war activity: Tobruk, Palestine, New Guinea and Australia. These men were all admitted to hospital—some in forward areas, some in base areas. I should like to make it quite clear that all figures or percentages quoted are given with, I hope, a full realization of the inadequacies of the statistical approach in psychiatry. They are included simply as an indication as to which factors are common and which are uncommon in such a survey.

#### Anxiety States.

States of anxiety in this series were by far the commonest neurotic disorder, and 50% of the total was the approximate incidence, both in forward and in base units. This type of disorder affected officers, non-commissioned officers and other ranks almost equally. The incidence was a little lower in men aged over thirty years than in men aged under thirty years; but when account is taken of the fact that there are probably fewer men in the forces aged over thirty years, this difference is not so significant.

Between 40% and 50% of the men affected had not encountered battle stress. Many of these men who broke down without stress showed evidence of early predisposition. Thus 30% had school records below the average; 25% had made less than the average adjustment in the occupational sphere prior to enlistment. Even before the outbreak of war, between 40% and 50% of these men had shown evidence of neurotic attitudes and neurotic behaviour patterns; 18% had experienced nervous breakdowns. On entering the services, between 20% and 40% of the men who later broke down quickly showed evidence of maladjustment to the *régime* of the army training camp.

In the study of those patients with anxiety states, other elements in the pre-war background were investigated. These included the question of neurotic inheritance and also of the so-called neurotic traits of childhood, such as nail biting, enuresis, temper tantrums, sleep walking and the like. It was found that a neurotic inheritance was probably present in a percentage of men ranging between 30 and 50. A history of neurotic traits of childhood was elicited from 40% of the men.

The question arises whether these figures of so-called psychological abnormality occurring in the pre-war phase really represent a significant difference from the normal. It is obvious that just as the recruit will usually attempt to conceal any evidence of pre-war psychological abnormality in his efforts to be accepted for military service, so later will he readily admit to any evidence of pre-war weaknesses if he is bent on an escape from service. It is true, too, that we have not examined a series of



psychologically normal men for the presence of the same pre-war psychological stigmata. However, if we attempt to correlate the presence of these weaknesses with the actual performance of the soldier, we are able to get more information on this point.

The incidence of pre-war neurotic traits in men who broke down without being subjected to battle stress was compared with the incidence in men who broke down after severe stress. It was found that there was a substantially lower figure in the latter group for the incidence of all the so-called background weaknesses mentioned, except two. These two were neurotic traits of childhood and neurotic family inheritance.

Further in this investigation, a group of men with anxiety states was divided into two groups according to whether or not they were successfully returned to duty after treatment. The incidence of background weakness in each group was compared. It was found that the incidence of neurotic family inheritance, poor education record and poor occupational adjustment was lower in those men who returned to their units. Therefore it may be that these features can be called prognostic pointers.

On the other hand, it does not seem that the presence of neurotic traits of childhood, previous nervous breakdown or neurotic symptoms in civil life are of any importance as individual prognostic aids, since they occurred almost equally in the two series.

To summarize, it seems that in anxiety states we may say with certainty only that unsatisfactory school and work records are the only two constant factors in the past history of a man which will be of any value in determining whether or not he will break down under heavy stress or in the absence of stress. We may say, also, that the same two factors determine whether he is able to readjust himself to continued service after once breaking down in the army.

Concerning the background factors mentioned, I believe that signs of maladjustment during the training period and the presence of a neurotic breakdown prior to enlistment, or both, are bad prognostic factors. Beyond this, it must be pointed out that the particular features of the early background of the soldiers which we have examined are only very few of the variables, the interaction and not the arithmetical summation of which determines whether or not the man will stand up to service without exhibiting neurotic symptoms.

The clinical features of neurotic anxiety in war differ in no essentials from those of peace time and do not merit special description. One point worth mentioning, however, is that the motivating factor of the anxiety often depends on service conditions. As a result, the therapist may be able completely to banish anxiety by removing the soldier from the environment responsible for it. Unhappily, in civilian neuroses, psychogenic factors are usually more complex and more difficult to manipulate. One further difference from civilian neurosis lies in the predominance of the somatic equivalents of anxiety rather than the emotional manifestations of conflict. This may be due in part to the fact that physical symptoms are accepted by the soldier and often by those who care for him as the main evidence of incapacity. Therefore, the soldier's best chance of receiving recognition for his inner conflict is to clothe it in the guise of a physical symptom.

The commonest symptom of anxiety state in these cases is fatigue, which occurs in at least 50%. Headache, and lack of concentration with a sense of depression, each occurs with approximately equal frequency in 30%. The onset is gradual in 60% of cases, and the soldier most commonly ascribes his anxiety state to events of battle. A history of associated physical illness, domestic maladjustment, and maladjustments in his unit, all occur almost equally in 20%.

The commonest somatic equivalent is gastro-intestinal disorder (in 36% of cases) in the form of dyspepsia, as distaste for army diet, or less commonly, as diarrhoea. Cardiac symptoms are less common; they have never exceeded a 20% incidence in my experience, and it is commonly lower. These symptoms are apparently much less frequent than in the last war, when the frequency of

cardiac symptoms gave rise to the diagnosis of "D.A.H." or "soldier's heart". The lower frequency of these symptoms in this war may be due to a decrease in the amount of prolonged marching. In this way the physiological sensations of cardiac overaction are not so frequently experienced by the soldier in this war, and there is less tendency, therefore, for him to interpret these sensations as evidence of cardiac disorder.

As in the anxiety states of civilian life, the clinical picture is commonly mixed, and the psychoneurosis often contains components of depression, hypochondriasis or hysteria. These elements occur with almost equal frequency, and the frequency ranges in the different series between 21% and 57%. In addition, in 5% of cases of anxiety states evidence of associated mental defect is present.

#### *Fear Reactions.*

It will be noted that no mention has been made so far of the acute anxiety or fear reactions resulting specifically from actual combat. These are placed in a separate category because they are more or less peculiar to combat. An examination of their nature bears out the truth of the fact observed by Slater and Sargant after Dunkirk, that even men of reasonably sound personality may break down if the strain is sufficiently severe. When we consider the combat reactions occurring in such men, we find some common characteristics. They occur in previously stable men who have endured more than the usual stress of combat. The reaction is appropriate to the stimulus producing it. There is open evidence of a state of fear which is but an exaggeration of the normal physiological reaction.

Finally, these men commonly recover after a short period of rest and may be successfully returned to their units. If ready recovery does not occur, one usually finds evidence, either of an overwhelming stress continued for a long time, or of the presence of weaknesses in the personality structure of the individual which make him less able to assimilate or adjust himself to the experiences of battle.

This combat reaction or fear state was seen best in my own experience of patients in Tobruk, and to a lesser extent in the New Guinea campaign. After a certain period of stress, the affected individual begins to sleep badly, his concentration wanes. He shows at first a normal fear response during the actual stress—that is, he becomes alert, restless, tense, showing evidence of sympathetic over-activity with dilated pupils, sweating and some tremor; he takes reasonable precautions from dive-bombing, shelling or mortar attack, and when the stimulus ceases, although he may exhibit pallor and tremor with apprehension, these pass off in an hour or two. His manner at this time is observed to be excessively quiet or grim. On the other hand, he may over-compensate by jocularity, by blasphemous outbursts or by a show of bravado. Gradually as the stress continues his alertness becomes over-alertness and increases to an incapacitating degree. Appetite wanes, sleep becomes impossible. He loses weight, becomes rather wild-looking, unkempt and haggard, jumping at the least sound and rushing to cover. Gradually, the state of over-alertness deepens so that any sound, however remotely it resembles the sounds significant of danger, evokes flight or the so-called "startle reaction". A sudden loud noise, the back-firing of a motor or a careless whistle, sends the affected individual rushing headlong to shelter. During bombing he may lie quiet and immobile, the picture of "frozen fear" in animals. He may exhibit slow, coarse tremor of the head and extremities with an immobility of expression strongly resembling that observed in Parkinsonism. On the other hand, the soldier may become confused, and shout and run about, endangering his own life. After the stress has passed he does not recover his poise, but continues in the misery of apprehension and alertness. If he is able to sleep, it is a sleep tortured by terrifying dreams of battle and flight. Even in his half-waking moments he may have brilliant reminiscences of his recent experiences, which assume an almost hallucinatory character. His judgement is impaired and interest in his environment is lost in the total pre-occupation with his fear.



If these stimuli are repeated day after day, the soldier becomes quite ineffective and exhibits signs of secondary physical exhaustion which are likely to be accepted by some physicians as the causal and not the secondary features of profound psychological upset. If the patient is admitted to hospital and adequately treated, he commonly recovers within two or three weeks.

#### *Conversion Hysteria.*

The incidence of conversion hysteria has been low in the series of cases examined, ranging between 9% and 12%. An examination of the figures for the south-west Pacific campaign between January, 1943, and June, 1944, shows the admission rate for hysteria to be 0.66 per 1,000 of men serving. For the sake of comparison, it is also noted that the rate for anxiety neurosis over the same period was 5.21 per 1,000. A feature of these cases of conversion hysteria is the infrequency of gross hysterical dissociations, such as paralysis, blindness, deafness and aphonia. Hysteria has more commonly produced disorders of consciousness in the form of amnesia, fugues and convulsions. Disorders of the speech mechanism in the form of stammering have also been common; but in most of these instances the affection has been in the form of a reactivation of a speech disorder which was present in childhood, but which disappeared partially or completely in early adult life.

The majority of instances of disturbance of consciousness have occurred as an escape from battle situations which have become intolerable, or as a reaction to situations involving undue responsibility. In the former case, the soldier has found that conscious existence during battle contains too many terrifying threats, and he therefore seeks relief until the threat has passed in a modification or loss of consciousness. It is relatively easy to treat such men and remove these symptoms, only to find, however, that one is often confronted with the emergence of a state of anxiety more difficult of treatment, since it is occurring in the hysterical personality. The outlook for future front-line service in these cases is not good.

When states of anxiety were discussed, it was noted that hysterical features were present in a proportion of cases. This incidence was as high as 37%, and the features took the form of transient paresis, "blackouts", hyperventilation syndrome, bizarre turns, tics, vomiting—all occurring in a setting of anxiety. These cases were described as anxiety hysteria because the element of anxiety appeared to be the most prominent.

#### *Depressive States.*

Depressive states occurred either in association with anxiety or as an uncomplicated picture of depression which was either endogenous or reactive. The endogenous depressive most frequently exhibited a past history of similar mood swings. When the depression occurred as part of an anxiety state—and this was found in as high a proportion as 37%—the depression was not severe, but it adversely affected the chances of a good readjustment and return to unit. In more recent cases the use of shock therapy for anxiety depression appears to have made it rather easier to render such patients more accessible to psychotherapy.

In the last 500 cases examined, uncomplicated psychoneurotic or psychotic depression was found in 9%. The clinical features differ in no essentials from those seen in civilian psychiatry.

Patients who exhibited severe depressive states in the battle situation often showed a sense of guilt and shame arising from feelings of failure and of having "let down" their mates. Some dated the onset of their depression from the death of a friend, and felt that by their actions they had been in some way responsible for it. Fortunately, such men responded well to electro-shock therapy.

#### *Psychosis.*

We come now to a consideration of the psychotic states occurring in soldiers. Aspects of this problem to be discussed will include the total incidence of insanity in the forces and the common types of disorder occurring. An

attempt will be made to evaluate what part, if any, war plays in causing or precipitating mental disorders in troops.

When considering the incidence of mental disorder, we noted earlier that the figure of 0.94 per 1,000 for soldiers compared unfavourably with the estimated incidence of 0.12 per 1,000 for a similar age group in civilians. We also noted that the incidence of psychosis in all psychiatric casualties in the Middle East in the period from 1940 to 1942 was 6.4% of the total. In my own series of cases the rate was higher—around 9% of all admissions to hospital for psychiatric disorders.

The commonest type of disorder was schizophrenia, which in the South-West Pacific campaign accounted for nearly half of the total number of psychotics. Obviously a consideration of this type of illness throws most light on the problems of psychosis of war.

By schizophrenia is meant that collection of mental illnesses, the subject of which shows a disintegration of the normal harmonious relationship which exists between thinking, feeling and behaving. It occurs in young adults, and is characterized by thought dissociation, erratic and impulsive behaviour, apathy, delusions, hallucinations and incongruous affective states with lack or diminution of insight. These are the commonest of the well-known symptoms of this disorder. Such a state is prone to occur in a type of personality described as schizoid. Such personalities are the sensitive, introverted, shut-in dreamers, who bridge the gap between ambition and its realization with dreams and phantasy rather than with reality. They are the seclusive, the poor mixers, the socially stilted and the inflexible people who fail in or shun the harsh contacts of everyday life.

It is generally recognized now that the state of schizophrenia is not a mental illness of sudden onset which occurs "out of the blue", but that it has its roots in the personality structure. It develops insidiously because the faulty reaction patterns of the individual prevent him from making a satisfactory compromise with his social environment. It often takes a crisis in the environmental situation to bring the fully fledged psychosis to recognition.

It has been said earlier in the lectures that for many individuals war service is a social revolution. For the schizoid personality war is a social catastrophe of the highest order. By this I mean particularly that gross change in environmental relationships which results from the throwing together of thousands of individuals in a new environment which is charged with change, drama and the threat of extinction. Which of these is the more important factor in precipitating the schizophrenic psychosis?

In answering this question, let me say that I believe that the events of battle and the stress of front-line service play a relatively small part, but in some cases battle stress may act as the final dramatic event which uncovers the developing psychosis.

In a recent examination of 100 schizophrenics, it was found that only 40% had been in contact with the enemy in any way. The remaining 60% had been subjected only to the changed social conditions consequent upon military service. Of this total, it was possible to detect clear evidence of a schizoid personality in 28%. I believe that a more accurate examination of the pre-service record of these men would have revealed such evidence in a much higher incidence than this.

Of these men, 5% had previously suffered schizophrenic illness. In another 14% of the illness was engrafted upon significant mental defect. I feel certain that these psychotic states were not closely related to the battle situation, and in a certain percentage of cases were not even remotely related to the war situation at all, for we must remember that the military age group of twenty to thirty-five years is, in the main, that age group in which schizophrenia occurs in any case, irrespective of the existence of war.

There is one perplexing problem in relation to these illnesses. It is the experience of most psychiatrists to encounter transient psychotic states, which exhibit a

number of the features of schizophrenia, but which occur apparently out of a blue sky, and in which there is little or no evidence to be obtained of the predisposed personality. Another feature of these illnesses is that they often do occur in the battle situation or in a forward area. Furthermore, they are extremely short-lived, and may be remitted within a few days to three weeks, with or without treatment. These patients may exhibit any of the usual features of schizophrenia, but most commonly they are disorientated, hallucinated and delusional, and violent, and require restraint. A large proportion exhibit paranoid reactions. Sometimes their illness may be ushered in by symptoms of anxiety after repeated stress. Often, too, after a rapid recovery from a psychotic phase, they may reexhibit these states of fear and anxiety.

These episodic states have been known to clear up within twenty-four hours, but they may take some weeks, and recovery from them is hastened dramatically by shock therapy. By some they have been called confusional states.

Grinker and Spiegel believe that episodic psychotic states similar to these may occur in the regressive states of behaviour associated with a condition of acute anxiety in battle. It may be that we have included in our diagnosis of episodic schizophrenia some of these conditions. One would need to observe many cases of battle reaction at their very early onset to support or disprove this hypothesis.

Another view, which is very reasonable, is that these episodes are in fact no more than hysterical manifestations occurring in states of overwhelming terror.

One fact, however, emerges, and that is that men of good personality structure who develop these episodic attacks recover quickly and completely. Those few who have been followed up have had no relapse.

The results of treatment with electric shock and insulin in the recent series of 100 cases of schizophrenia described are as follows: 50% of patients showed complete remission and were discharged from the army with no evidence of psychosis; 36% made a social remission and were considered fit to make a living in civilian life; 14% either quickly relapsed after treatment, or had to be either certified insane or discharged to their homes with almost complete limitation in the occupational sphere.

Psychotic states other than schizophrenia occurring in my own experience differ in no way from the accepted type and rate of psychosis in any population of the same age group. These included the manic-depressive psychoses, melancholia, psychoses of alcoholic and syphilitic origin and mental defect. I do not believe that the war situation has played a significant part in the production or aggravation of these states. I have not seen a case of psychosis resulting from cerebral trauma, but my experience of severe head injury in the army is almost nil.

Transient delirious states occurred, of course, in the expected incidence in the acute military fevers, such as in malignant malaria and in scrub typhus, but they were most uncommon.

It is not proposed in these lectures to discuss fully the subject of the treatment of psychiatric casualties, but rather to indicate what I consider to be main principles. One aspect of treatment which will be discussed in more detail is the problem of post-war management of the neurotic soldier—in other words, the problem of rehabilitation of the psychologically damaged ex-soldier.

It is now a generally accepted fact that psychiatric casualties are more successfully treated near to the front line, where one is able to concentrate on predominantly war-caused maladjustments. In such a case, treatment is possible before the clinical picture has become confused by the complicating factors which as we have seen come into operation once the soldier has been evacuated to a base area. One has little chance of inducing a patient to reface a temporarily intolerable situation if he has once negotiated a long avenue of escape. Such an avenue of escape to a base area is prone to carry one-way traffic only.

Treatment must be commenced as soon as possible after the onset of symptoms, and if this is achieved many weeks will be saved in obtaining a satisfactory result. Figures

from my own series of cases illustrate these two points. In Tobruk, treatment was prompt and close to the front line. As a result, 61% of men could be returned to their units, and the average stay in hospital was less than three weeks. In New Guinea, in somewhat similar conditions, 48% of men were returned to duty, and the average stay in hospital was less than one month. Contrast these with the results which I experienced in a base area in Palestine, where only 22% of men could be returned to their units and the average stay in hospital was three months. In Australia, in the base area where I am at present working, from which the war is far away, and where one is at the end of a long line of evacuation, the present ratio of men returned to unit is 7.1% and the average time occupied in hospital is three and a half months.

It is preferable that in the milder cases of psychological disorder occurring in the front line the patient should be treated by the regimental medical officer and not in hospital. This practice has proved successful when the regimental medical officer is aware of the importance of psychological disorder in his troops and has taken care to maintain a close watch for evidence of incipient breakdown.

The treatment of acute battle reactions in hospital comprises rest and sedation with simple psychotherapy, explanation and reassurance being used. Recent experiences of American psychiatrists in the Tunisian campaign emphasize the great importance of attempting to bring about release of the acute anxiety of combat reactions. They have extensively used "Pentothal Sodium" by intravenous injection as an adjunct to psychotherapy in this connexion. By these means the soldier is enabled more easily to reexperience, in the presence of the therapist, the traumatic situation through which he has recently passed. By the use of "Pentothal Sodium", the therapist is aided in obtaining a more satisfactory history, and the patient commonly experiences relief consequent upon the release of a number of repressed emotions. Under the guidance of the therapist the patient is encouraged to reface the situation which has caused his breakdown, and if possible an attempt is made to reestablish more controlled and more rational attitudes towards the stressful situations through which the patient has recently passed.

My own experiences of this technique of so-called "Pentothal" narcosynthesis in the treatment of battle reactions is very small, but I am sure that the field is well worthy of exploitation. "Pentothal Sodium" has been used more extensively in base hospital psychiatric practice in my own experience. Here, the results are by no means uniform or dramatic; but there seems no doubt of the method's efficacy as a short cut in uncovering latent repressed conflicts in neurotic states. It enables the therapist more quickly to overcome initial resistance to psychotherapy and increases rapport. It is a useful starting point for more serious psychotherapy.

Insulin shock, "Cardiazol" shock and electric shock treatment have limited applications in relatively forward areas. "Cardiazol" shock therapy has been found of value in acute psychotic illnesses of depressive or schizophrenic type. It has been commonly found that a few treatments will relieve the acute troublesome phase of the illness and allow a less stormy transport of the patient to a base area for thorough treatment.

Much has been written concerning the value of insulin and electric shock treatment in war psychiatry, and in the time available it is possible only to summarize my impressions. They are as follows.

Insulin sub-coma therapy is of value as a tonic measure aimed at increasing appetite and weight, and at improving the patient's sense of physical well-being. Insulin also acts as a means of induced sedation in some cases. Moreover, it often has a useful psychological effect, in that the patient feels that he is at last having a serious attack made upon the treatment of his illness. However, it is difficult to believe that insulin sub-coma therapy has a specific effect in the treatment of neurotic states. Sub-coma insulin therapy is generally found to be most useful in cases of anxiety state in which dyspeptic symptoms predominate.

Like all other physical measures of treatment, it stands in second place to psychotherapy.

Insulin full-coma treatment appears to have a beneficial effect in a large number of cases of schizophrenia, and for this condition it appears to be more useful than electric shock. As with sub-coma insulin treatment, full-coma therapy must be followed closely in a number of cases by some form of psychotherapy. It must be stated that, whilst encouraging successes are obtained in the treatment of schizophrenia with insulin, so also there are many disappointing results.

Electric shock appears to be a useful form of treatment for depressive states, either psychotic or neurotic in origin. Electric shock occasionally gives good results in the treatment of hysterical dissociations of consciousness. One is struck, however, with the tendency of psychotic conditions to relapse quickly after shock treatment in a proportion of instances. This is much less pronounced in the neurotic depressive states than in the psychoses. Electric shock in neurotic depression appears to remove sufficient of the depressive elements of the illness to allow of a more easy approach by psychotherapy.

Of the other forms of treatment, occupational therapy, particularly that aimed at pre-vocational and vocational training, is most useful. I have left the question of psychotherapy till now. Little can be said here on this extensive subject. It has been the tendency of some medical officers, myself included, rather to neglect serious attempts at psychotherapy in war psychiatry. This results partly from the fact that in a large proportion of cases a cure can be effected by simple manipulation of the patient's environment, and partly because little time has been available for this form of treatment. However, recent experience in a base hospital dealing with a large number of psychoneurotic states has proven that the corner-stone of treatment in military psychiatry is still the patient-doctor interview, together with some form of psychotherapy, whether this therapy is superficial, or whether it is in the form of a serious attempt to uncover and to correct long-standing pathological attitudes.

In summary it may be said that the essentials of treatment of the psychological disorders of war are that treatment should be prompt and in a forward area, that there have been useful advances in physical therapy, but that the old, well-established principles of psychotherapy hold pride of place as the basis of good psychiatry.

#### Repatriation of the Neurotic Ex-Soldier.

We turn now to consideration of the most important aspects of treatment of the psychological ills of war—namely, the management of the repatriated neurotic soldier and his rehabilitation into the post-war world of employment.

It is fashionable at the present stage of the war to envisage the post-war period either as one of gloom, depression and difficulty, with social unrest and disillusionment, or on the other hand, as a period in which expansive optimism will guide the hand of post-war planners. There are, of course, people who believe cynically and perhaps hopefully that things will go on just the same no matter what is done. In this lecture it is impossible to discuss post-war economic and social problems, but there is no doubt that they will be considerable. It is certain that the period of post-war psychological readjustment will be difficult. Many thousands of families whose lives have been profoundly affected, financially and socially—some beneficially, others adversely—will face a return to an existence no longer dominated by a national organization. During the war period the average soldier has been fed, clothed and tended medically, his decisions have been made for him, his responsibilities have been carried by his superiors. He has had the security of constant employment, and if he was content to have it so, that employment has been without the stimulus of competition. On demobilization, he is discharged into a society which will at first welcome him back as a conquering hero, but which may, in the absorbing business of pursuing its own concerns, quickly forget his years of service.

He will return to a life where economic security may be uncertain, where he will once more enter into competition

with his fellows to earn a hard living in a dull way. The excitement of the diversity of army life may be replaced by the relatively colourless existence of everyday home life.

For many men of stable personality, these difficulties will represent just another of the problems of adjustment which they will face and more or less overcome; but for those for whom war has temporarily filled a psychological need or who have acquired a submission to or a dependence upon the army, there will be difficulties in the process of reestablishing their mental and social independence. The problem of rehabilitation of the neurotic soldier is one which concerns us most, and we shall consider two types in particular.

The first is the soldier whose neurosis has as one of its main causes deep resentment of the authority principle, this resentment being an elaboration of a life-long attitude towards authority. Such a man may have developed during service fixed neurotic patterns, which, should they persist into the post-war environment, will incapacitate him. He will lay at the door of the army or the State complete responsibility for his failure in post-war adjustment.

The other type of neurotic soldier is the man who, rendered neurotic as the result of battle stress, remains incapable of undertaking full peace-time employment.

In both these types one will see the tragic paradox of a grateful country paying the neurotic repatriate a fortnightly dole so that he may retain his symptoms, in order that the grateful country may feel that it has discharged its responsibilities to him. One fears that the assistance proffered to help him to regain normality may be a bottle of bromide and a fortnightly pension. I have no doubt whatever that the payment of a pension for neurotic disability is an iniquity. It is the very antithesis of all reasonable principles of treatment that the neurotic repatriate should be shackled to his neurosis by a monetary return for the continuance of his symptoms. The nature of his illness is such that pride and satisfaction in achievement—one of the mainsprings of human activity—are already diminished owing to his limited capacity for consistent effort. One of the principles upon which his recovery depends is the exploitation and development of that capacity for effort which he still possesses. There is not the least doubt that what his country owes him is not a pension, but firstly, adequate treatment of his psychological disorder, and secondly, the opportunity to use his limited capabilities. If anyone should doubt the validity of these observations, let him talk to and observe the mode of existence of a pensioned neurotic sufferer from the last war—unhappily there are still thousands of them—and he will see how these men are submerged in a state of chronic neuroticism with a well-established resentment syndrome which has by now resolved itself into a struggle for maintenance or increase of pension and a condition of resigned acceptance of the hopelessness of their malady.

The question of adequate treatment for the neurotic repatriate involves a review of existing facilities for in-patient and out-patient psychiatry in Australia. As far as this State is concerned, the position is easy to review, because the facilities are lamentably inadequate for even present-day needs, and the need will be much greater in post-war years.

I believe that it is not an exaggeration to say that in all medical disorders for which out-patient treatment is given in public hospitals in Victoria, approximately one-half have a predominantly psychological rather than a physical causation. This estimate does not include those easily recognizable neurotic states—usually chronic—which are generally referred to one of the four psychiatric out-patient clinics in Melbourne. There are in Victoria, so far as I am aware, facilities for in-patient treatment of no more than 80 or 100 neurotics of public hospital class. The facilities for treatment of pre-psychoses and non-certifiable early psychoses are equally inadequate. There is no private hospital of any size catering for the treatment of neurosis or psychosis. The supply of trained psychiatrists is unequal to the demand, the reason for this being that in this State, as in other States in Australia, psychiatry is still regarded by many medical men and by a great number of the laity as a somewhat peculiar



the institution of a daily local news sheet, reliable information was provided to take the place of rumours. The food was improved, and fresh meat and even live sheep were brought to the area by destroyer at great risk.

The importance of retaliative action as a means of releasing anxiety was shown prominently during air raids, when men would grasp any weapon, however ineffective, in an attempt to damage low-flying aircraft, often verbally expressing immense relief when they entered the struggle against diving aircraft even though they were armed only with rifles. The increasing efficiency of anti-aircraft defence with a mounting score of destroyed enemy machines did much to counter the feeling that the soldier was a defenceless quarry without a chance of hitting back. Gradually the viewpoint changed, and the improvement in morale is well illustrated by the words of an anti-aircraft gunner, who said: "They're just like bloody ducks anyway."

The siege atmosphere invokes also useful psychological mechanisms. The most prominent of these is a compensatory stimulus which comes to men who are occupied in the defence of a situation from which they know they cannot escape. Such a situation brings with it a strong feeling of mutual comradeship, not always present under conditions of more diffused fighting. Most of the men in the area gained some inspiration from the knowledge that they were comrades in arms in a common trial of resistance.

In the New Guinea campaign there were present stimuli of a different type—stimuli especially characteristic of jungle fighting. Of first importance was the tremendous demand made on physical endurance. In the early stages, advance to the front line was over the Kokoda trail, which wound its dreadful way over back-breaking, seemingly endless mountain ranges. The men made their way in single file through endless mud under the constant drizzle of tropical rain. The day's march was on the "rendezvous" principle, as all organized marching was impracticable, with the result that the advantages of mass marching, which provides a stimulus to the man who is flagging, were lost. Progress became a matter of individual endurance. At the end of the terrible trail, weary men were confronted with a new, strange type of warfare. There was no "line", no forward or rear position. Seldom was there a large aggregation of the enemy to engage in one position; seldom indeed could he ever be seen. He was an invisible menace behind a moving curtain of leaves and shadows. The detection of sound and movement became a factor of prime biological importance. Warfare was a struggle, not of units, but of individuals. The momentum imparted by concerted attack was absent. Such conditions called for a display of cunning, of personal aggressiveness and of courage of the highest order. Most of the men quickly proved that they possessed these qualities; but a few, whose success as soldiers depended upon the momentum of the herd, developed as a result of these conditions, serious and sometimes incapacitating mental difficulties.

#### The Effects of Evacuation to a Base Area.

Let us assume now that the soldier is removed from front-line action, and that he returns to a base area. Here, he may be resting or engaged in retraining and regrouping. He may, on the other hand, be in hospital—ill or wounded. In either case, return to a base area brings immediate relief to this weary, over-stimulated man. Many suffering from normal fear states quickly recover their stability. Those who are struggling with fear reactions, but who carried on until evacuated wounded or sick, are often very well in hospital because they have achieved an honourable escape from an almost intolerable dilemma, wearing the badge of a physical rather than of an emotional disability.

However, the line of evacuation is not a panacea for all psychological ills. In the first place, the soldier is returned to base emotionally over-charged or sensitized. By this is meant he is now conditioned to noises and the effects of other frightful stimuli, so that fear reactions can now be reinvoked in all their former intensity by other noises, by a sight, by a reminiscence or by the recounting of a battle tale. He may also retain the horror of the battle field in brilliant and terrifying dreams.

It is difficult to be certain of the exact mechanism responsible for this condition of fear or anxiety in men of previously good personality after their return from the scene of battle action. It may be due to the presence of a pathological state of continuing neural excitation. It may be that in these cases there exists a state of facility in the diencephalic mechanisms which control sympathetic nervous system outflow. In this respect, it has been shown experimentally by Grinker that the hypothalamus acts like a condenser discharging repeated bursts of excitation, which may influence cortical activity long after the cessation of the original stimulus. This, then, may serve to explain why external stimuli such as loud noises may result in sympathetic outbursts long after the individual is removed from the field of battle. This mechanism, which was originally biologically relevant, has now become pathological, because the reaction is now inappropriate to the reality.

Other factors also are operative during the change from front line to base area, which contribute to continuous neurotic exacerbations or even to the initial development of states of anxiety. The bolstering effect of exciting stimuli has been lost. Now comes a period of reflection. The soldier, who has carried on whilst in the line without exhibiting outwardly any evidence of conflict, may decide, consciously or unconsciously, that he may be unable to face return to a similar stressful situation. If he is wounded or ill, it may be possible for him to defer facing this painful prospect until the protective badge of physical disability is plucked from him and he is ready for discharge back to his unit. It is at this time that he may fashion for himself a similar badge, woven, however, of different material. He now exteriorizes his latent anxiety in the form of physical symptoms of disability. He may show, therefore, for the first time, headache, dyspnoea, palpitation, subjective sensations related to the gastro-intestinal tract, or some other of the somatic equivalents of anxiety. This process may be entirely unconscious. Of course, it may be reinforced by a conscious elaboration; but this, after all, is a very common human tendency during any physical illness.

Again, we must remember that the soldier, who during training and in action is carried beyond the consideration of the importance of his own personal concerns and individual aims by the group momentum of war, may again change in his attitude when he reaches a base area. Here there is greater opportunity for personal thinking and personal planning. The concept of national insecurity does not seem so tangible now. The urgency of the common purpose pales before the pressure of personal concern. His family and domestic worries now assume prominence. Matters of family health and welfare begin to worry him. There is growing awareness of personal ties and perhaps of financial sacrifice involved in serving in the army. Letters from home reinforce the growing awareness of long-standing sex deprivation. These, together with the countless personal problems, intrude more and more on his consciousness. He may look about him and notice now his own maladjustment in his unit. Perhaps he has been passed over for promotion and is resentful. The idiosyncrasies of people about him begin to irritate him. He finds that a large number of men are being released from service on medical, compassionate or manpower grounds. Why should he not be one of them? His army job may now closely resemble his civilian job, but the amenities of civilian existence are missing. He is subjected to the restrictions of military service without its beneficial stimuli. His work and life are controlled by military law, whilst the work of his non-military, but equally militant, confrères at home is interrupted and governed by industrial strife. Little wonder, then, that in men whose sense of national idealism is waning, the emphasis on the present group struggle gives way now to an emphasis on individual problems.

#### The Soldier and his Adjustment.

We have now encompassed, in brief, what may be termed the psychological state which obtains in the various theatres of warfare, and have pointed out that the mental

health of the soldier depends on his ability to adjust the various contingencies in these theatres. How many men do actually fail in this task of adjustment and become psychiatric casualties? Does the war lead to more neurotic and psychotic breakdowns than occur normally in a population not at war? These are perhaps two of the most important questions emerging from a study of war psychology. They are difficult questions to answer for two reasons. In the first place we have never been able to assess accurately the normal incidence of neurosis in the civil population. Secondly, we find that figures for neurosis in the army are obviously much lower than the actual incidence. The reason for this is that army statistics for neurosis admit only, in general, figures for overt neurosis, and do not include the many cases of neurosis which are masked by a frankly somatic guise—such guises as chronic dyspepsia, eye strain, flat feet, varicose veins. When soldiers with this type of complaint are carefully examined, one frequently discovers a substantial state of neuroticism associated with the symptoms of bodily disorder, and it is this state of neuroticism which is the incapacitating element of the illness. There are also cases in which a minimal stated physical disability becomes a total disability because of the addition of psychological elements to the illness. As examples of such comparatively minor physical ailments, one might mention bronchitis, sinusitis, fibrositis, painful wound scars.

However, let us compare the stated incidences of neurosis in civil and in military life so far as these can be determined. British and American figures suggest that between 11 and 50 individuals per 1,000 of the normal population show evidence of overt neurotic disorder requiring medical attention. The rate for the army between January, 1943, and January, 1944, was seven per 1,000 of all soldiers in the south-west Pacific area. The latter figure, it might be argued, is much lower than the true figure, and it must be admitted in this respect that of all men discharged from the army as medically unfit, at least 50% have, in fact, a predominantly psychological disability. This does not prove, however, that war produces any more neurosis than occurs in civilian life. Indeed, I feel sure that this ratio of predominantly psychological to predominantly physical illness is not far short of that which obtains in the out-patient clinics of most civilian hospitals.

What is the rate of neurotic casualties compared with that of other casualties in war time? Here again one must accept the figures with reservation, because for reasons stated, the figures for physical illness really include many true cases of psychological disorder. The figures for the Middle East campaign between 1940 and 1942 show that of all reported illnesses requiring admission of the patient to hospital, battle casualties comprised 4%, physical illnesses 93.6%, neurotic illnesses 2.4%, and psychotic illness 0.1%. These figures cover many thousands of hospital admissions. A much smaller series of figures collected from my own cases is in general agreement with those official figures. In the New Guinea campaign, in my own experience, the percentage of neurotic and psychiatric casualties admitted to one hospital over a period of five months was 2.1.

What is the position with regard to insanity occurring in soldiers as compared with the incidence of insanity in civil life? Here again we must accept statistics with proper reservation. Figures taken from an examination of all our forces engaged in the South-West Pacific campaign from January, 1943, to June, 1944, show an over-all rate for psychosis, mental defect excluded, of 0.94 per 1,000.

For the purpose of making some sort of comparison with the rate in civilians, I have compared this figure with the percentage of certified persons, mental defectives excluded, admitted to mental hospitals in Victoria over a period of one year (1941). The figure for the incidence of certifiable psychosis in Victoria is 0.06 per 1,000 in that age group which corresponds to the age group in the services—namely, twenty to thirty-five years.

The higher army figure of 0.94 per 1,000 may be said to include nearly all cases of psychosis actually occurring in the services, because one must remember that all soldiers who show even slight evidence of psychotic behaviour are quickly detected and sent to hospital. On the other hand,

it is a fair generalization that in civil life there are as many psychotic persons outside mental hospitals as there are inside, simply because their malady is not sufficiently severe to require certification and they are able to be cared for by their relatives.

We may safely say, then, that the rate may be more truly held to be 0.12 per 1,000 for civilians as compared with 0.94 per 1,000 for soldiers. The rate of psychosis still appears higher in the army, but not so much higher as to suggest that war service is a strong cause of psychotic breakdown. Moreover, when we come to examine the type of psychotic breakdown in the service, we see that on the whole it is more superficial and more transient than that which commonly occurs in civilians.

#### Types of Nervous Disorder among Servicemen.

We have now examined the setting in which psychological disorder occurs in war time, and have indicated in a general way, as far as statistics will tell, the incidence of nervous and mental illness. I shall now discuss the various types of nervous disorder which occur among servicemen, their incidence and their character, indicating any features which seem peculiar to mental breakdown under service conditions, in contrast to similar peace-time conditions. In this connexion I shall at times make use of figures and percentages in estimating the significant factors found on examination of a group of psychiatric casualties. These figures are taken from a study of approximately 2,500 patients seen in the following spheres of war activity: Tobruk, Palestine, New Guinea and Australia. These men were all admitted to hospital—some in forward areas, some in base areas. I should like to make it quite clear that all figures or percentages quoted are given with, I hope, a full realization of the inadequacies of the statistical approach in psychiatry. They are included simply as an indication as to which factors are common and which are uncommon in such a survey.

#### Anxiety States.

States of anxiety in this series were by far the commonest neurotic disorder, and 50% of the total was the approximate incidence, both in forward and in base units. This type of disorder affected officers, non-commissioned officers and other ranks almost equally. The incidence was a little lower in men aged over thirty years than in men aged under thirty years; but when account is taken of the fact that there are probably fewer men in the forces aged over thirty years, this difference is not so significant.

Between 40% and 50% of the men affected had not encountered battle stress. Many of these men who broke down without stress showed evidence of early predisposition. Thus 30% had school records below the average; 25% had made less than the average adjustment in the occupational sphere prior to enlistment. Even before the outbreak of war, between 40% and 50% of these men had shown evidence of neurotic attitudes and neurotic behaviour patterns; 18% had experienced nervous breakdowns. On entering the services, between 20% and 40% of the men who later broke down quickly showed evidence of maladjustment to the *régime* of the army training camp.

In the study of those patients with anxiety states, other elements in the pre-war background were investigated. These included the question of neurotic inheritance and also of the so-called neurotic traits of childhood, such as nail biting, enuresis, temper tantrums, sleep walking and the like. It was found that a neurotic inheritance was probably present in a percentage of men ranging between 30 and 50. A history of neurotic traits of childhood was elicited from 40% of the men.

The question arises whether these figures of so-called psychological abnormality occurring in the pre-war phase really represent a significant difference from the normal. It is obvious that just as the recruit will usually attempt to conceal any evidence of pre-war psychological abnormality in his efforts to be accepted for military service, so later will he readily admit to any evidence of pre-war weaknesses if he is bent on an escape from service. It is true, too, that we have not examined a series of

psychologically normal men for the presence of the same pre-war psychological stigmata. However, if we attempt to correlate the presence of these weaknesses with the actual performance of the soldier, we are able to get more information on this point.

The incidence of pre-war neurotic traits in men who broke down without being subjected to battle stress was compared with the incidence in men who broke down after severe stress. It was found that there was a substantially lower figure in the latter group for the incidence of all the so-called background weaknesses mentioned, except two. These two were neurotic traits of childhood and neurotic family inheritance.

Further in this investigation, a group of men with anxiety states was divided into two groups according to whether or not they were successfully returned to duty after treatment. The incidence of background weakness in each group was compared. It was found that the incidence of neurotic family inheritance, poor education record and poor occupational adjustment was lower in those men who returned to their units. Therefore it may be that these features can be called prognostic pointers.

On the other hand, it does not seem that the presence of neurotic traits of childhood, previous nervous breakdown or neurotic symptoms in civil life are of any importance as individual prognostic aids, since they occurred almost equally in the two series.

To summarize, it seems that in anxiety states we may say with certainty only that unsatisfactory school and work records are the only two constant factors in the past history of a man which will be of any value in determining whether or not he will break down under heavy stress or in the absence of stress. We may say, also, that the same two factors determine whether he is able to readjust himself to continued service after once breaking down in the army.

Concerning the background factors mentioned, I believe that signs of maladjustment during the training period and the presence of a neurotic breakdown prior to enlistment, or both, are bad prognostic factors. Beyond this, it must be pointed out that the particular features of the early background of the soldiers which we have examined are only very few of the variables, the interaction and not the arithmetical summation of which determines whether or not the man will stand up to service without exhibiting neurotic symptoms.

The clinical features of neurotic anxiety in war differ in no essentials from those of peace time and do not merit special description. One point worth mentioning, however, is that the motivating factor of the anxiety often depends on service conditions. As a result, the therapist may be able completely to banish anxiety by removing the soldier from the environment responsible for it. Unhappily, in civilian neuroses, psychogenic factors are usually more complex and more difficult to manipulate. One further difference from civilian neurosis lies in the predominance of the somatic equivalents of anxiety rather than the emotional manifestations of conflict. This may be due in part to the fact that physical symptoms are accepted by the soldier and often by those who care for him as the main evidence of incapacity. Therefore, the soldier's best chance of receiving recognition for his inner conflict is to clothe it in the guise of a physical symptom.

The commonest symptom of anxiety state in these cases is fatigue, which occurs in at least 50%. Headache, and lack of concentration with a sense of depression, each occurs with approximately equal frequency in 30%. The onset is gradual in 60% of cases, and the soldier most commonly ascribes his anxiety state to events of battle. A history of associated physical illness, domestic maladjustment, and maladjustments in his unit, all occur almost equally in 20%.

The commonest somatic equivalent is gastro-intestinal disorder (in 36% of cases) in the form of dyspepsia, as distaste for army diet, or less commonly, as diarrhoea. Cardiac symptoms are less common; they have never exceeded a 20% incidence in my experience, and it is commonly lower. These symptoms are apparently much less frequent than in the last war, when the frequency of

cardiac symptoms gave rise to the diagnosis of "D.A.H." or "soldier's heart". The lower frequency of these symptoms in this war may be due to a decrease in the amount of prolonged marching. In this way the physiological sensations of cardiac overaction are not so frequently experienced by the soldier in this war, and there is less tendency, therefore, for him to interpret these sensations as evidence of cardiac disorder.

As in the anxiety states of civilian life, the clinical picture is commonly mixed, and the psychoneurosis often contains components of depression, hypochondriasis or hysteria. These elements occur with almost equal frequency, and the frequency ranges in the different series between 21% and 57%. In addition, in 5% of cases of anxiety states evidence of associated mental defect is present.

#### *Fear Reactions.*

It will be noted that no mention has been made so far of the acute anxiety or fear reactions resulting specifically from actual combat. These are placed in a separate category because they are more or less peculiar to combat. An examination of their nature bears out the truth of the fact observed by Slater and Sargent after Dunkirk, that even men of reasonably sound personality may break down if the strain is sufficiently severe. When we consider the combat reactions occurring in such men, we find some common characteristics. They occur in previously stable men who have endured more than the usual stress of combat. The reaction is appropriate to the stimulus producing it. There is open evidence of a state of fear which is but an exaggeration of the normal physiological reaction.

Finally, these men commonly recover after a short period of rest and may be successfully returned to their units. If ready recovery does not occur, one usually finds evidence, either of an overwhelming stress continued for a long time, or of the presence of weaknesses in the personality structure of the individual which make him less able to assimilate or adjust himself to the experiences of battle.

This combat reaction or fear state was seen best in my own experience of patients in Tobruk, and to a lesser extent in the New Guinea campaign. After a certain period of stress, the affected individual begins to sleep badly, his concentration wanes. He shows at first a normal fear response during the actual stress—that is, he becomes alert, restless, tense, showing evidence of sympathetic over-activity with dilated pupils, sweating and some tremor; he takes reasonable precautions from diving-bombing, shelling or mortar attack, and when the stimulus ceases, although he may exhibit pallor and tremor with apprehension, these pass off in an hour or two. His manner at this time is observed to be excessively quiet or grim. On the other hand, he may over-compensate by jocularly, by blasphemous outbursts or by a show of bravado. Gradually as the stress continues his alertness becomes over-alertness and increases to an incapacitating degree. Appetite wanes, sleep becomes impossible. He loses weight, becomes rather wild-looking, unkempt and haggard, jumping at the least sound and rushing to cover. Gradually, the state of over-alertness deepens so that any sound, however remotely it resembles the sounds significant of danger, evokes flight or the so-called "startle reaction". A sudden loud noise, the back-firing of a motor or a careless whistle, sends the affected individual rushing headlong to shelter. During bombing he may lie quiet and immobile, the picture of "frozen fear" in animals. He may exhibit slow, coarse tremor of the head and extremities with an immobility of expression strongly resembling that observed in Parkinsonism. On the other hand, the soldier may become confused, and shout and run about, endangering his own life. After the stress has passed he does not recover his poise, but continues in the misery of apprehension and alertness. If he is able to sleep, it is a sleep tortured by terrifying dreams of battle and flight. Even in his half-waking moments he may have brilliant reminiscences of his recent experiences, which assume an almost hallucinatory character. His judgement is impaired and interest in his environment is lost in the total pre-occupation with his fear.



If these stimuli are repeated day after day, the soldier becomes quite ineffective and exhibits signs of secondary physical exhaustion which are likely to be accepted by some physicians as the causal and not the secondary features of profound psychological upset. If the patient is admitted to hospital and adequately treated, he commonly recovers within two or three weeks.

#### *Conversion Hysteria.*

The incidence of conversion hysteria has been low in the series of cases examined, ranging between 9% and 12%. An examination of the figures for the south-west Pacific campaign between January, 1943, and June, 1944, shows the admission rate for hysteria to be 0.66 per 1,000 of men serving. For the sake of comparison, it is also noted that the rate for anxiety neurosis over the same period was 5.21 per 1,000. A feature of these cases of conversion hysteria is the infrequency of gross hysterical dissociations, such as paralysis, blindness, deafness and aphonia. Hysteria has more commonly produced disorders of consciousness in the form of amnesia, fugues and convulsions. Disorders of the speech mechanism in the form of stammering have also been common; but in most of these instances the affection has been in the form of a reactivation of a speech disorder which was present in childhood, but which disappeared partially or completely in early adult life.

The majority of instances of disturbance of consciousness have occurred as an escape from battle situations which have become intolerable, or as a reaction to situations involving undue responsibility. In the former case, the soldier has found that conscious existence during battle contains too many terrifying threats, and he therefore seeks relief until the threat has passed in a modification or loss of consciousness. It is relatively easy to treat such men and remove these symptoms, only to find, however, that one is often confronted with the emergence of a state of anxiety more difficult of treatment, since it is occurring in the hysterical personality. The outlook for future front-line service in these cases is not good.

When states of anxiety were discussed, it was noted that hysterical features were present in a proportion of cases. This incidence was as high as 37%, and the features took the form of transient paresis, "blackouts", hyperventilation syndrome, bizarre turns, tics, vomiting—all occurring in a setting of anxiety. These cases were described as anxiety hysteria because the element of anxiety appeared to be the most prominent.

#### *Depressive States.*

Depressive states occurred either in association with anxiety or as an uncomplicated picture of depression which was either endogenous or reactive. The endogenous depressive most frequently exhibited a past history of similar mood swings. When the depression occurred as part of an anxiety state—and this was found in as high a proportion as 37%—the depression was not severe, but it adversely affected the chances of a good readjustment and return to unit. In more recent cases the use of shock therapy for anxiety depression appears to have made it rather easier to render such patients more accessible to psychotherapy.

In the last 500 cases examined, uncomplicated psychoneurotic or psychotic depression was found in 9%. The clinical features differ in no essentials from those seen in civilian psychiatry.

Patients who exhibited severe depressive states in the battle situation often showed a sense of guilt and shame arising from feelings of failure and of having "let down" their mates. Some dated the onset of their depression from the death of a friend, and felt that by their actions they had been in some way responsible for it. Fortunately, such men responded well to electro-shock therapy.

#### *Psychosis.*

We come now to a consideration of the psychotic states occurring in soldiers. Aspects of this problem to be discussed will include the total incidence of insanity in the forces and the common types of disorder occurring. An

attempt will be made to evaluate what part, if any, war plays in causing or precipitating mental disorders in troops.

When considering the incidence of mental disorder, we noted earlier that the figure of 0.94 per 1,000 for soldiers compared unfavourably with the estimated incidence of 0.12 per 1,000 for a similar age group in civilians. We also noted that the incidence of psychosis in all psychiatric casualties in the Middle East in the period from 1940 to 1942 was 6.4% of the total. In my own series of cases the rate was higher—around 9% of all admissions to hospital for psychiatric disorders.

The commonest type of disorder was schizophrenia, which in the South-West Pacific campaign accounted for nearly half of the total number of psychotics. Obviously a consideration of this type of illness throws most light on the problems of psychosis of war.

By schizophrenia is meant that collection of mental illnesses, the subject of which shows a disintegration of the normal harmonious relationship which exists between thinking, feeling and behaving. It occurs in young adults, and is characterized by thought dissociation, erratic and impulsive behaviour, apathy, delusions, hallucinations and incongruous affective states with lack or diminution of insight. These are the commonest of the well-known symptoms of this disorder. Such a state is prone to occur in a type of personality described as schizoid. Such personalities are the sensitive, introverted, shut-in dreamers, who bridge the gap between ambition and its realization with dreams and phantasy rather than with reality. They are the seclusive, the poor mixers, the socially stilted and the inflexible people who fail in or shun the harsh contacts of everyday life.

It is generally recognized now that the state of schizophrenia is not a mental illness of sudden onset which occurs "out of the blue", but that it has its roots in the personality structure. It develops insidiously because the faulty reaction patterns of the individual prevent him from making a satisfactory compromise with his social environment. It often takes a crisis in the environmental situation to bring the fully fledged psychosis to recognition.

It has been said earlier in the lectures that for many individuals war service is a social revolution. For the schizoid personality war is a social catastrophe of the highest order. By this I mean particularly that gross change in environmental relationships which results from the throwing together of thousands of individuals in a new environment which is charged with change, drama and the threat of extinction. Which of these is the more important factor in precipitating the schizophrenic psychosis?

In answering this question, let me say that I believe that the events of battle and the stress of front-line service play a relatively small part, but in some cases battle stress may act as the final dramatic event which uncovers the developing psychosis.

In a recent examination of 100 schizophrenics, it was found that only 40% had been in contact with the enemy in any way. The remaining 60% had been subjected only to the changed social conditions consequent upon military service. Of this total, it was possible to detect clear evidence of a schizoid personality in 28%. I believe that a more accurate examination of the pre-service record of these men would have revealed such evidence in a much higher incidence than this.

Of these men, 5% had previously suffered schizophrenic illness. In another 14% of the illness was engrafted upon significant mental defect. I feel certain that these psychotic states were not closely related to the battle situation, and in a certain percentage of cases were not even remotely related to the war situation at all, for we must remember that the military age group of twenty to thirty-five years is, in the main, that age group in which schizophrenia occurs in any case, irrespective of the existence of war.

There is one perplexing problem in relation to these illnesses. It is the experience of most psychiatrists to encounter transient psychotic states, which exhibit a

number of the features of schizophrenia, but which occur apparently out of a blue sky, and in which there is little or no evidence to be obtained of the predisposed personality. Another feature of these illnesses is that they often do occur in the battle situation or in a forward area. Furthermore, they are extremely short-lived, and may be remitted within a few days to three weeks, with or without treatment. These patients may exhibit any of the usual features of schizophrenia, but most commonly they are disorientated, hallucinated and delusional, and violent, and require restraint. A large proportion exhibit paranoid reactions. Sometimes their illness may be ushered in by symptoms of anxiety after repeated stress. Often, too, after a rapid recovery from a psychotic phase, they may reexhibit these states of fear and anxiety.

These episodic states have been known to clear up within twenty-four hours, but they may take some weeks, and recovery from them is hastened dramatically by shock therapy. By some they have been called confusional states.

Grinker and Spiegel believe that episodic psychotic states similar to these may occur in the regressive states of behaviour associated with a condition of acute anxiety in battle. It may be that we have included in our diagnosis of episodic schizophrenia some of these conditions. One would need to observe many cases of battle reaction at their very early onset to support or disprove this hypothesis.

Another view, which is very reasonable, is that these episodes are in fact no more than hysterical manifestations occurring in states of overwhelming terror.

One fact, however, emerges, and that is that men of good personality structure who develop these episodic attacks recover quickly and completely. Those few who have been followed up have had no relapse.

The results of treatment with electric shock and insulin in the recent series of 100 cases of schizophrenia described are as follows: 50% of patients showed complete remission and were discharged from the army with no evidence of psychosis; 36% made a social remission and were considered fit to make a living in civilian life; 14% either quickly relapsed after treatment, or had to be either certified insane or discharged to their homes with almost complete limitation in the occupational sphere.

Psychotic states other than schizophrenia occurring in my own experience differ in no way from the accepted type and rate of psychosis in any population of the same age group. These included the manic-depressive psychoses, melancholia, psychoses of alcoholic and syphilitic origin and mental defect. I do not believe that the war situation has played a significant part in the production or aggravation of these states. I have not seen a case of psychosis resulting from cerebral trauma, but my experience of severe head injury in the army is almost nil.

Transient delirious states occurred, of course, in the expected incidence in the acute military fevers, such as in malignant malaria and in scrub typhus, but they were most uncommon.

It is not proposed in these lectures to discuss fully the subject of the treatment of psychiatric casualties, but rather to indicate what I consider to be main principles. One aspect of treatment which will be discussed in more detail is the problem of post-war management of the neurotic soldier—in other words, the problem of rehabilitation of the psychologically damaged ex-soldier.

It is now a generally accepted fact that psychiatric casualties are more successfully treated near to the front line, where one is able to concentrate on predominantly war-caused maladjustments. In such a case, treatment is possible before the clinical picture has become confused by the complicating factors which as we have seen come into operation once the soldier has been evacuated to a base area. One has little chance of inducing a patient to reface a temporarily intolerable situation if he has once negotiated a long avenue of escape. Such an avenue of escape to a base area is prone to carry one-way traffic only.

Treatment must be commenced as soon as possible after the onset of symptoms, and if this is achieved many weeks will be saved in obtaining a satisfactory result. Figures

from my own series of cases illustrate these two points. In Tobruk, treatment was prompt and close to the front line. As a result, 61% of men could be returned to their units, and the average stay in hospital was less than three weeks. In New Guinea, in somewhat similar conditions, 48% of men were returned to duty, and the average stay in hospital was less than one month. Contrast these with the results which I experienced in a base area in Palestine, where only 22% of men could be returned to their units and the average stay in hospital was three months. In Australia, in the base area where I am at present working, from which the war is far away, and where one is at the end of a long line of evacuation, the present ratio of men returned to unit is 7.1% and the average time occupied in hospital is three and a half months.

It is preferable that in the milder cases of psychological disorder occurring in the front line the patient should be treated by the regimental medical officer and not in hospital. This practice has proved successful when the regimental medical officer is aware of the importance of psychological disorder in his troops and has taken care to maintain a close watch for evidence of incipient breakdown.

The treatment of acute battle reactions in hospital comprises rest and sedation with simple psychotherapy, explanation and reassurance being used. Recent experiences of American psychiatrists in the Tunisian campaign emphasize the great importance of attempting to bring about release of the acute anxiety of combat reactions. They have extensively used "Pentothal Sodium" by intravenous injection as an adjunct to psychotherapy in this connexion. By these means the soldier is enabled more easily to reexperience, in the presence of the therapist, the traumatic situation through which he has recently passed. By the use of "Pentothal Sodium", the therapist is aided in obtaining a more satisfactory history, and the patient commonly experiences relief consequent upon the release of a number of repressed emotions. Under the guidance of the therapist the patient is encouraged to reface the situation which has caused his breakdown, and if possible an attempt is made to reestablish more controlled and more rational attitudes towards the stressful situations through which the patient has recently passed.

My own experiences of this technique of so-called "Pentothal" narcosynthesis in the treatment of battle reactions is very small, but I am sure that the field is well worthy of exploitation. "Pentothal Sodium" has been used more extensively in base hospital psychiatric practice in my own experience. Here, the results are by no means uniform or dramatic; but there seems no doubt of the method's efficacy as a short cut in uncovering latent repressed conflicts in neurotic states. It enables the therapist more quickly to overcome initial resistance to psychotherapy and increases rapport. It is a useful starting point for more serious psychotherapy.

Insulin shock, "Cardiazol" shock and electric shock treatment have limited applications in relatively forward areas. "Cardiazol" shock therapy has been found of value in acute psychotic illnesses of depressive or schizophrenic type. It has been commonly found that a few treatments will relieve the acute troublesome phase of the illness and allow a less stormy transport of the patient to a base area for thorough treatment.

Much has been written concerning the value of insulin and electric shock treatment in war psychiatry, and in the time available it is possible only to summarize my impressions. They are as follows.

Insulin sub-coma therapy is of value as a tonic measure aimed at increasing appetite and weight, and at improving the patient's sense of physical well-being. Insulin also acts as a means of induced sedation in some cases. Moreover, it often has a useful psychological effect, in that the patient feels that he is at last having a serious attack made upon the treatment of his illness. However, it is difficult to believe that insulin sub-coma therapy has a specific effect in the treatment of neurotic states. Sub-coma insulin therapy is generally found to be most useful in cases of anxiety state in which dyspeptic symptoms predominate.

Like all other physical measures of treatment, it stands in second place to psychotherapy.

Insulin full-coma treatment appears to have a beneficial effect in a large number of cases of schizophrenia, and for this condition it appears to be more useful than electric shock. As with sub-coma insulin treatment, full-coma therapy must be followed closely in a number of cases by some form of psychotherapy. It must be stated that, whilst encouraging successes are obtained in the treatment of schizophrenia with insulin, so also there are many disappointing results.

Electric shock appears to be a useful form of treatment for depressive states, either psychotic or neurotic in origin. Electric shock occasionally gives good results in the treatment of hysterical dissociations of consciousness. One is struck, however, with the tendency of psychotic conditions to relapse quickly after shock treatment in a proportion of instances. This is much less pronounced in the neurotic depressive states than in the psychoses. Electric shock in neurotic depression appears to remove sufficient of the depressive elements of the illness to allow of a more easy approach by psychotherapy.

Of the other forms of treatment, occupational therapy, particularly that aimed at pre-vocational and vocational training, is most useful. I have left the question of psychotherapy till now. Little can be said here on this extensive subject. It has been the tendency of some medical officers, myself included, rather to neglect serious attempts at psychotherapy in war psychiatry. This results partly from the fact that in a large proportion of cases a cure can be effected by simple manipulation of the patient's environment, and partly because little time has been available for this form of treatment. However, recent experience in a base hospital dealing with a large number of psychoneurotic states has proven that the corner-stone of treatment in military psychiatry is still the patient-doctor interview, together with some form of psychotherapy, whether this therapy is superficial, or whether it is in the form of a serious attempt to uncover and to correct long-standing pathological attitudes.

In summary it may be said that the essentials of treatment of the psychological disorders of war are that treatment should be prompt and in a forward area, that there have been useful advances in physical therapy, but that the old, well-established principles of psychotherapy hold pride of place as the basis of good psychiatry.

#### Repatriation of the Neurotic Ex-Soldier.

We turn now to consideration of the most important aspects of treatment of the psychological ills of war—namely, the management of the repatriated neurotic soldier and his rehabilitation into the post-war world of employment.

It is fashionable at the present stage of the war to envisage the post-war period either as one of gloom, depression and difficulty, with social unrest and disillusionment, or on the other hand, as a period in which expansive optimism will guide the hand of post-war planners. There are, of course, people who believe cynically and perhaps hopefully that things will go on just the same no matter what is done. In this lecture it is impossible to discuss post-war economic and social problems, but there is no doubt that they will be considerable. It is certain that the period of post-war psychological readjustment will be difficult. Many thousands of families whose lives have been profoundly affected, financially and socially—some beneficially, others adversely—will face a return to an existence no longer dominated by a national organization. During the war period the average soldier has been fed, clothed and tended medically, his decisions have been made for him, his responsibilities have been carried by his superiors. He has had the security of constant employment, and if he was content to have it so, that employment has been without the stimulus of competition. On demobilization, he is discharged into a society which will at first welcome him back as a conquering hero, but which may, in the absorbing business of pursuing its own concerns, quickly forget his years of service.

He will return to a life where economic security may be uncertain, where he will once more enter into competition

with his fellows to earn a hard living in a dull way. The excitement of the diversity of army life may be replaced by the relatively colourless existence of everyday home life.

For many men of stable personality, these difficulties will represent just another of the problems of adjustment which they will face and more or less overcome; but for those for whom war has temporarily filled a psychological need or who have acquired a submission to or a dependence upon the army, there will be difficulties in the process of reestablishing their mental and social independence. The problem of rehabilitation of the neurotic soldier is one which concerns us most, and we shall consider two types in particular.

The first is the soldier whose neurosis has as one of its main causes deep resentment of the authority principle, this resentment being an elaboration of a life-long attitude towards authority. Such a man may have developed during service fixed neurotic patterns, which, should they persist into the post-war environment, will incapacitate him. He will lay at the door of the army or the State complete responsibility for his failure in post-war adjustment.

The other type of neurotic soldier is the man who, rendered neurotic as the result of battle stress, remains incapable of undertaking full peace-time employment.

In both these types one will see the tragic paradox of a grateful country paying the neurotic repatriate a fortnightly dole so that he may retain his symptoms, in order that the grateful country may feel that it has discharged its responsibilities to him. One fears that the assistance proffered to help him to regain normality may be a bottle of bromide and a fortnightly pension. I have no doubt whatever that the payment of a pension for neurotic disability is an iniquity. It is the very antithesis of all reasonable principles of treatment that the neurotic repatriate should be shackled to his neurosis by a monetary return for the continuance of his symptoms. The nature of his illness is such that pride and satisfaction in achievement—one of the mainsprings of human activity—are already diminished owing to his limited capacity for consistent effort. One of the principles upon which his recovery depends is the exploitation and development of that capacity for effort which he still possesses. There is not the least doubt that what his country owes him is not a pension, but firstly, adequate treatment of his psychological disorder, and secondly, the opportunity to use his limited capabilities. If anyone should doubt the validity of these observations, let him talk to and observe the mode of existence of a pensioned neurotic sufferer from the last war—unhappily there are still thousands of them—and he will see how these men are submerged in a state of chronic neuroticism with a well-established resentment syndrome which has by now resolved itself into a struggle for maintenance or increase of pension and a condition of resigned acceptance of the hopelessness of their malady.

The question of adequate treatment for the neurotic repatriate involves a review of existing facilities for in-patient and out-patient psychiatry in Australia. As far as this State is concerned, the position is easy to review, because the facilities are lamentably inadequate for even present-day needs, and the need will be much greater in post-war years.

I believe that it is not an exaggeration to say that in all medical disorders for which out-patient treatment is given in public hospitals in Victoria, approximately one-half have a predominantly psychological rather than a physical causation. This estimate does not include those easily recognizable neurotic states—usually chronic—which are generally referred to one of the four psychiatric out-patient clinics in Melbourne. There are in Victoria, so far as I am aware, facilities for in-patient treatment of no more than 80 or 100 neurotics of public hospital class. The facilities for treatment of pre-psychoses and non-certifiable early psychoses are equally inadequate. There is no private hospital of any size catering for the treatment of neurosis or psychosis. The supply of trained psychiatrists is unequal to the demand, the reason for this being that in this State, as in other States in Australia, psychiatry is still regarded by many medical men and by a great number of the laity as a somewhat peculiar



speciality, practised by rather queer men, who are pre-occupied with unholy things called complexes. This attitude is partly the result of the extraordinarily small part of the medical curriculum allotted to the teaching of psychological medicine, so that the graduate commences practice with a detailed knowledge of the soma and a distrust born of ignorance of the psyche, and often, so far as he is concerned, "never the twain shall meet".

In other countries, for many years they have met in the enlightened concept of psychosomatic medicine. This concept recognizes the indivisible interrelationship of psychological and physical components of human maladies. Strecker, of Philadelphia, states the problem of education of the medical viewpoint to the psychosomatic concept as follows:

The way to get something done thoroughly is to begin at the beginning. The beginning is in the preclinical years of medical education. Medicine not only has its physics or somatics, but also its "psychics" or psychogenetics. There could be a true and helpful teaching parallel. If there are livers and spleens and hearts in anatomy, so, too, is there an anatomy of psychology which should study normal emotions, consciousness, memory *et cetera*. If there is a physiology which teaches how organs work, so, too, and at the same time, should a physiology of mental functions be taught. The student should learn how they work. Paralleling histology, the microscopic study of normal organs and tissues, there should be given opportunities to become familiar with the finer subdivisions of mental functions; for instance, remote and recent memory, the gradations of normal consciousness, the infinite variety of emotional shadings. When the Department of Pathology is demonstrating gross morbid lesions, luetic aortitis, liver abscess and what not, the Department of Psychiatry should be showing the gross pathology of the mind, marked emotional deviations like profound melancholia or complete dementia. Likewise should there be the twin teaching of microscopic pathology, let us say, on the one hand, the study of two cross-sections of an arteriosclerotic vessel or the walls of an abscess, on the other a span of amnesia or the degrees of katatonic stupor. If the loaf of medical practice is to be thoroughly leavened, the medical student must be given from his first week in medical school the opportunity of studying all of the man and not only a hypothetical somatic half.

What, then, is required in the way of facilities for treatment? Firstly, a much larger supply of physicians trained in psychosomatic medicine, who will operate in psychiatric clinics, either attached to existing civilian hospitals, or, if socialized medicine ever becomes an established fact, in a psychiatric service centralized in large capital cities with subsidiary centres in country districts.

Each psychosomatic unit must contain sufficient psychiatrists, psychologists and social workers, and be provided with adequate clerical and statistical staff. Their function is the diagnosis and the in-patient or out-patient treatment of neurotic or non-certifiable psychotic disorder. Further, they must be responsible for teaching and research and for the study of the psychological problems of industry. They must be in direct liaison with established social bodies and educationists, and with employers of labour. The last-mentioned is probably one of the most important functions in the treatment of neurotic disorder. It must be appreciated that the hospital psychiatrist, working in general hospitals, is at present so grossly overworked that he is quite unable to give anything approaching complete treatment for neurotic disorder. A psychiatrist who has fifty or sixty patients to see in the morning is quite incapable of providing anything but "three-minute" psychotherapy in even the most promising cases. The volume of work which he is in fact able to do effectively is something of this order: he is capable of seeing four new patients in a half-day session, or of reviewing twelve to fifteen old cases. One psychotherapeutic session occupies approximately one hour, and in favourable cases each patient must be seen at least twice a week.

A psychologist might be able to examine three new patients in one half-day. His function in such a clinic is the measurement of intelligence and aptitude and the investigation of the various methods of personality assessment, as exemplified by the Rorschach technique and by

the other so-called personality inventories. His sphere would also include advice on industrial problems, in which psychological factors were operative in producing difficulties.

The role of the social worker is most important. A practising psychiatrist is at present greatly handicapped in treatment if he is unable to attempt some manipulation of the patient's social and domestic environment. He is handicapped in diagnosis by lack of time and opportunity correctly to assess the social and domestic background of the neurotically ill.

One social worker occupied full time is able to cope with the work provided by two psychiatrists. At present the Red Cross Society has at its disposal social workers and trainees engaged in this work in military hospitals. For the relatively small army population their numbers are inadequate. The task will be considerably heavier in handling the post-war neurotically ill.

It has been said before that one of the most important aspects of treatment of the neurotic ex-soldier lies in his successful placement in a satisfying occupation that will occupy him to the full extent of his capabilities and provide stimulus to a satisfaction in achievement. This problem of rehabilitation, post-war training and manpower placement is looming as a tremendous one, even at this stage of the war when the labour market is relatively empty. Even now, however, avenues for quick employment offering good conditions and good monetary return are closing. The extent to which this labour situation will deteriorate will, of course, be an index in the post-war years of the ability of the country to recover its economic equilibrium and will depend on post-war industrial planning. A small follow-up of the repatriated neurotics so far placed in industry has yielded information which leaves the psychiatrist with mixed feelings of optimism and defeat. Many men are flying quickly to well-paid but temporary jobs, whose permanence depends on the continuance of war. These are dead-end jobs. Other men attempting to return to their pre-war avocation find that changed conditions prejudice their continuing in this line. Many industrial fields are already filled. Manpower problems are further intensified by the fact that the pre-war social misfits or psychopaths, who were always unstable investments in the labour market, are being returned from the services to civilian employment. They are, as ever, still unstable, and are presenting employment and social problems which they presented prior to enlistment.

One of the biggest problems of the post-war period will be the replacement in industry of men who have limited capacities for continuous work.

I have indicated that to employ these men in some way is one of the cardinal principles governing their recovery. It is hard to imagine how the bulk of employers in industry will view the absorption of such men. They will hesitate to employ them, or if they do, when the worker breaks down he will be discharged in favour of a sound man. I have wondered if it is outside the bounds of possibility that we may attack the problem in a manner in which it has been done in Britain and America. I understand that in these countries, certain industries employ men of limited capacities in annexes attached to a normal plant. It is found that in such cases it is possible to improve the efficiency of the inadequate man often to a point at which he may take his place beside his more fortunate fellows, and in the process the limited worker is helped to regain pride in himself and to reestablish his mental stability. The idea of employing only partially efficient men in industry is, of course, contrary to established principles of business economy. It may be possible, however, for the Government to take a hand in this problem, either by the establishment of special industrial plants for use as rehabilitation centres, or alternatively, by subsidizing the employers of such men with limited capabilities in order to compensate for the lowered efficiency output on the basic wage.

Sufficient has been said, therefore, to indicate that in any clinic which is established for the treatment of psychological maladjustments there must be a representative of the employment machine, or else there must be close col-

laboration with actual employers of labour. Therefore, I think that the clinic should include an employment officer, who would have on the one hand direct access to medical and psychological opinions, and on the other a direct avenue to employers of labour. The success of his work would depend on individual and personal supervision of placement. If such a man is a bureaucratic nonentity without personal contact with the actual employers of labour, his work will be valueless.

With regard to clerical assistance in such a clinic, no apology is made for including in this lecture a note of the present need in clinical medicine, and in psychological medicine particularly, for a revision of our ideas of the written medical record. The medical profession in its work still largely records the case history and examination of patients by means of illegibly scribbled words. Enormous masses of important clinical information are lost forever because they are written, and usually written in a hurry. The vast wealth of clinical material in our hospitals has never been compiled so that it can be readily accessible for the purpose of statistical evaluation or clinical study. In the field of psychiatry, adequate legible record of the patient's illness is of the first importance. Any mass study of psychological disorder which is attempted without this aid will collapse under its own disorderly weight. I would say that adequate and up-to-date recording methods are an essential part of any proposed psychosomatic unit.

#### CONCLUSION.

This is the conclusion of these lectures, and these are the salient points which I have attempted to stress.

War service imposes upon the individual the necessity to adjust himself psychologically to a new social structure. There is imposed upon him the necessity to reorientate himself to different cultural, ethical, moral and other social standards. In this task he fails, or stands by the particular personality type which he possessed prior to enlistment. His mental equipment and his previous life are important in this respect. This applies particularly to the reaction pattern which he has laid down in childhood. Many ill-endowed men fall in the task long before they reach front-line service, and it is pointed out that actual combat plays a less important role in the causation of mental and emotional disorder than is popularly supposed.

The combat situation has been described in general terms, more particularly in Tobruk and in New Guinea, and it has been shown how battle stress, if sufficiently severe, may precipitate breakdown even in men of good personality. Here again, the soldier's reaction in combat depends also on a number of factors which have their roots in the past rather than in the more dramatic events of the present.

I have shown how men may lose or deny the group ideal of war when after action they return to a base area. I have endeavoured to point out the dangers of frustration and disillusionment in such areas resulting in a loss of group morale and in a tendency to lay emphasis on personal concerns, such as family and social maladjustments, so that neurotic states may first make their appearance at this late period of a soldier's career.

An attempt has been made to estimate the incidence of neurosis in the army and to compare it with the calculated incidence amongst civilians. It would seem that there is no undue disparity, though admittedly it is almost impossible to assess accurate statistics.

The incidence of psychosis in the army is not greatly in excess of that which obtains in civilian life for the same age group.

The common types of neurotic state have been enumerated; anxiety states head the list by a long way. It has been noted that anxiety states are as prone to occur without battle stress as with it, and this fact is attributed to background factors in the personality which predispose it to neurotic breakdown. Of these predisposing factors, it seems that unsatisfactory school and occupational adjustments represent the commonest evidence of pre-war neurotic trends.

The similarities and differences between anxiety states of war and those of peace have been mentioned, and it has been seen that there is no essential difference, but that the presence of so-called somatic equivalents of anxiety are much commoner in war neuroses. Of these equivalents, the gastro-intestinal type predominates.

The state of fear, physiological and pathological, has been described, and the so-called combat reaction has been identified.

The common hysterical manifestations seen in war have been noted, and it has been seen that the commonest disturbances are disturbances of consciousness.

The psychotic states have been described, and it is seen that schizophrenia or a schizophrenia-like state is by far the commonest psychotic manifestation in war time. I wish to emphasize the intriguing problem of the transient schizophrenia-like state, but do so without venturing a satisfactory identification or classification of this type of psychotic reaction.

Apart from these last-mentioned states, it is my opinion that the battle situation plays little part in causing schizophrenia; though admittedly, it may uncover a psychosis which has been developing for some time.

The question of treatment has been dealt with in a brief and general way. I have attempted to stress two points particularly: first, the absolute necessity for early treatment near the front line, and secondly, the proved value of psychotherapy as the most important form of treatment, in spite of many advances in physical methods of treatment.

Finally, the question of post-war rehabilitation has been stressed as the necessary complement to any treatment of war neurosis. I have no illusions as to the difficulties involved in this immense task, nor have I any illusions as to the unsatisfactory way in which we have coped with the problem so far.

I have attempted to point out how unprepared we are in our attitude, in our medical education and in our hospital and social facilities to cope with the problem of post-war psychological maladjustment, and have submitted a general plan for improvement. This plan is neither original nor complete. It involves no more than the principles of an approach to a better psychiatric service for the post-war neurotic.

One integral part of this plan involves a much closer attention by the psychiatrist and social worker to detailed problems of employment of men of limited capacities.

We should have no illusions about difficulties in post-war readjustment. There are ample grounds for qualms. There is, however, evidence of a growth of understanding of the importance of psycho-somatic medicine. In this respect, let us hope that the post-war period will bring some realization of the ideal which prompted Beattie-Smith in the early part of the century to endow this lectureship.

#### Acknowledgements.

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HYPERTENSIVE STATES IN PREGNANCY.<sup>1</sup>

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Discussion of hypertensive states in pregnancy cannot proceed satisfactorily without an attempt at classification of those states, confusing and overlapping as they often are. The grouping adopted by the American Committee on Maternal Welfare in 1940 can be used here, and could well be generally used in all large clinics and by workers in this field. As Dieckmann<sup>(2)</sup> has pointed out, final classification may have to await follow-up of the patients.

**Group A: Disease not Peculiar to Pregnancy.**

1. Hypertensive disease (hypertensive cardio-vascular disease): (a) Benign (essential). (b) Malignant.
2. Renal Disease: (a) Chronic vascular nephritis or nephrosclerosis. (b) Glomerulonephritis. (c) Nephrosis. (d) Other renal disease (such as pyelonephritis).

**Group B: Disease Dependent on, or Peculiar to, Pregnancy.**

1. Preeclampsia: (a) Mild. (b) Severe.
2. Eclampsia: (a) Convulsive. (b) Non-convulsive (that is, with coma and post-mortem findings typical of eclampsia).

**Group C: Vomiting of Pregnancy.****Group D: Unclassified Toxæmias.**

Groups C and D will not be discussed.

The disturbance in Group B has been well called the specific hypertensive disease of pregnancy, and it may be superimposed on preexisting hypertension or on preexisting renal disease. This true primary toxæmia of pregnancy typically occurs insidiously in the healthy young *primipara*; as is well known, it appears in the last trimester. Twin pregnancy is a predisposing factor, and it occurs more frequently in diabetes than in its absence. It is characterized by oedema, evident or occult, and by arteriolar spasm with hypertension. Its aetiology remains uncertain, but it is certain that morbidity and mortality can be effectively lowered by careful ante-natal supervision, with observation for abnormal increase in weight, for proteinuria and for rise in blood pressure. Other factors are the provision of optimum nutrition with first-class protein, vitamins, iron and calcium. In a recent article Williams<sup>(3)</sup> states that the demands of foetal and maternal growth and tissue repair in the latter half of pregnancy require that the pregnant woman be given 1.5 grammes of protein per kilogram of body weight. Williams quotes the results of an investigation by Tompkins<sup>(4)</sup> who observed two groups of women—a control group on a diet of their own choosing, and a study group receiving a diet well balanced and with a content of 110 grammes of protein; it was noted that toxæmia and mild hypertension were four times more frequent in the control group than in the study group, oedema was five times more frequent, and early preeclampsia was eight times as frequent. Excessive or too rapid gain in weight should be countered by restriction of salt intake to prevent this retention of water—a retention which occurs in normal pregnancy and is exaggerated in many patients with toxæmia. This also applies to the sodium ion, which may be given to the patient as medicine.

Can this specific hypertensive disease be predicted? Will it occur more frequently in subjects with a latent tendency to vascular disease? The cold pressor test devised by Hines and Brown has been used in the hope that detection of hyper-reactors will give an indication of those likely to develop toxæmia. Application of this test has given variable results. Wellen is quoted by Goldring and Chasis<sup>(5)</sup> as finding no correlation between the hyper-reactors to the cold pressor test and the appearance of the specific hypertensive disease of pregnancy. They also refer to Chesley and Chesley's<sup>(6)</sup> work; these authorities similarly found no correlation. Theobald<sup>(7)</sup> in 1933, being impressed by the gloomy views previously published on the sequelæ of toxæmia of pregnancy, studied the decennial report for 1911 to 1920 of the Registrar-General for England and Wales. These figures showed that for seventy years the mortality curves for women had followed the same

upward and downward tendencies as those for men, and that there was very little difference between the mortality rates for married and single women up to the age of fifty-five years. Theobald's inquiries embraced the deaths from "Bright's disease", from cerebral hæmorrhage and from diseases of the circulatory system including arteriosclerosis and cerebral embolism and thrombosis. Browne<sup>(8)</sup> concludes that the only convincing explanation of Theobald's observations is that those women who develop hypertensive cardio-vascular disease after toxæmia were originally predisposed to it, and would have developed it even though they had never become pregnant. Isenhour *et alii*<sup>(9)</sup> state that although the incidence of hypertension following toxæmia in pregnancy has been stressed, no such follow-up studies were available on women whose pregnancies were not complicated by evidence of vascular and renal disease. They examined the histories of 900 nulliparous and 900 parous women, and considered those hypertensive whose systolic blood pressures averaged 140 millimetres of mercury or more and whose average diastolic pressures were 90 millimetres of mercury or more. They could not demonstrate any additional hypertensive patients in any age groups of parous women when compared with nulliparous women, and concluded that "this complication of pregnancy occurs for the most part, if not exclusively, in patients whose vascular systems are endowed with the tendency toward hypertensive disease". On the same lines, Barnes and Browne<sup>(10)</sup> examined the blood pressures of 915 nulliparous women and of 1,041 parous women. From their examination of the figures they concluded that patients with toxæmia can be divided into two groups: (i) those whose vascular systems are normal and who develop the specific hypertensive disease of pregnancy and have no sequelæ; (ii) those in whom there is a tendency to hypertensive vascular disease; in this second group they consider that hypertension would ultimately develop even without pregnancy.

While these studies suggest that pregnancy toxæmia is more prone to develop in those patients who have a latent hypertensive tendency, no "test" has yet been devised which will effectively discover these patients prior to pregnancy. The taking of a careful family history is worth while because of the frequent familial incidence of hypertension and vascular disease. The significance of transient rises in blood pressure should not be overlooked.

**Group A: Diseases not Peculiar to Pregnancy.****Hypertensive Cardio-Vascular Disease.**

**Benign Hypertension.**—Included in this group are women whose systolic blood pressure does not exceed 160 millimetres of mercury and whose diastolic blood pressure does not exceed 100 millimetres, whose hearts are not clinically dilated and who have no subjective or objective evidence of cardiac failure, whose retinal arterioles are normal, who have no proteinuria, whose renal function tests give perfect results, and in whose urinary deposits there are no significant hæmaturia and no significant increase in tube casts. Hypertension may still be called benign when the systolic and diastolic pressures are higher, when hearts are hypertrophied and when retinal arteriolar change is present, but as a rule evidence of renal impairment is absent; when the renal arteriolar damage is sufficient, the condition of these patients may pass into the class of nephrosclerosis, and it will be difficult to distinguish from chronic glomerulonephritis except on the basis of the clinical history and from prior knowledge of the evolution of the disease.

**Malignant Hypertension.**—Pregnancy should not be allowed to continue in the presence of malignant hypertension, which is a fatal and progressive disease.

**Renal Disease.**

**Chronic Vascular Nephritis or Nephrosclerosis.**—The section comprising chronic vascular nephritis or nephrosclerosis include those patients with vascular disease in whom renal arteriolar sclerosis led to renal damage and impairment.

**Chronic Glomerulonephritis.**—In the "chronic glomerulonephritis" group the patients may give a history of previous acute nephritis; renal function may be impaired,

<sup>1</sup> Read at a meeting of the New South Wales Branch of the British Medical Association on June 28, 1945.



but compensated, and the urine will usually contain protein, casts and red blood cells. Acute glomerulonephritis may chance to complicate pregnancy.

**Nephrosis.**—Nephrosis will usually be the nephrotic complication of chronic glomerulonephritis and is rarely associated with pregnancy.

**Other Renal Diseases.**—Other renal diseases (such as pyelonephritis) may be present, but will be difficult to identify except on presumption.

#### Comment.

In a discussion of Group A, the following questions may be asked: "Which patients are likely to be unaffected by toxæmia and should be allowed to continue pregnancy? What is the maternal and fetal risk involved? What is the effect of pregnancy on the course of previously established vascular or renal disease?"

There seems to be little doubt that many patients with benign hypertension may complete pregnancy without complications; others will suffer the superimposition of a state indistinguishable from specific hypertensive toxæmia. The prediction of a complication seems impossible. These patients may undertake pregnancy under meticulous supervision, with termination of the pregnancy upon evidence of toxæmia, œdema, increase of proteinuria and hypertension.

Dexter *et alii*<sup>(1)</sup> recorded that 20 of 39 patients with hypertension before pregnancy (they included all varieties of condition in one group) failed to have a further increase in the blood pressure or albuminuria, despite the appearance in two-thirds of them of generalized œdema. Approximately 50% of these authors' patients developed toxæmia of pregnancy, which they considered indistinguishable from the preeclampsia and the eclampsia occurring in patients whose blood pressure and urine were normal before pregnancy, and they class this condition as toxæmia of pregnancy superimposed on hypertension existing before pregnancy.

Wellen<sup>(2)</sup> studied 64 women in 69 pregnancies, and found that only 10% to 15% of women with preexisting hypertension failed to suffer from complications. In 51 cases in 56 pregnancies a superimposed non-convulsive toxæmia developed.

#### Discussion.

For local experience I am indebted to Dr. J. N. Chesterman and Dr. T. Dixon Hughes for some figures from the records of their private practices.

It was not possible to obtain records of blood pressures before pregnancy; however, it was considered that in the absence of albuminuria the blood pressures recorded before and up to the twentieth week of pregnancy probably were an approximate indication of the levels before pregnancy. A blood pressure of 140 millimetres of mercury (systolic) and 90 millimetres (diastolic) was considered to indicate hypertension; allowance was made for nervousness and tachycardia. With these standards, 32 patients had hypertension in 36 pregnancies, 12 pregnancies were complicated; in these 12 pregnancies there occurred a significant increase of blood pressure, proteinuria and usually œdema, which in 11 instances led to induction of labour before term. There were two fetal deaths. This comparatively low fetal death rate was probably due to the fact that when complication occurred, it was usually near term, and prompt induction of labour presumably saved the fetus. There was one maternal death. All the patients were examined frequently, salt restriction was practised almost without exception, and they were promptly admitted to hospital at the first sign of trouble. Increase of hypertension and proteinuria almost always occurred in the last trimester. The likelihood of complication was not indicated by the height of the systolic and diastolic blood pressures early in pregnancy. One patient early in pregnancy had a systolic pressure of 200 millimetres of mercury and a diastolic pressure of 130 millimetres; she came through the pregnancy satisfactorily with a living child, and had the same blood pressure four years later. The average age of the patients was thirty-three years; 27 of the 32 women were thirty years of age or over; 16 of the 32 were *primipare*, and in two cases toxæmia with a still-born fetus had previously occurred.

The above standard of hypertension is certainly too high for the normal pregnant woman; in the records there is abundant evidence that a systolic blood pressure of over 130 millimetres of mercury and a diastolic pressure of over 80 millimetres is abnormal and is an indication of possible trouble. Increase of systolic pressure may be due to nervousness occasioned by the first visit to a doctor and the associated tachycardia; often, however, it is present on subsequent occasions. Therefore, a "casual" blood pressure reading may be significant.

Which patients with hypertension before pregnancy are likely to be unaffected by toxæmia and should be allowed to continue pregnancy? It would appear that this cannot at present be predicted. In the presence of chronic nephritis, when the renal defect is compensated or minimal, pregnancy may be attempted. In hypertension, when renal involvement is not evident, there is a reasonable prospect of an uncomplicated pregnancy. Decision may rest on the number of children already born and living, and the risk may not be taken by a mother who already has a sufficient family.

What is the maternal risk? It is presumably from eclampsia, which should usually be prevented, or from left ventricular failure with pulmonary œdema.

What is the effect of pregnancy on the course of previously established vascular or renal disease? Recent views of investigators are that hypertension and associated renal processes are not aggravated by pregnancy. Barnes and Brown,<sup>(3)</sup> in a recent investigation of hypertension in multiparous and parous women in relation to the remote prognosis of the toxæmias of pregnancy, have concluded that there is no evidence that pregnancy permanently aggravates hypertension already existing when pregnancy starts, and that there is no justification for terminating an early pregnancy in a patient who has essential hypertension. Wellen and his associates<sup>(2)</sup> performed renal clearance tests on six pregnant women with preexisting hypertension. Two of the women had diffuse glomerulonephritis antedating pregnancy. These workers concluded from the results of tests of the glomerular filtration rate and the tubular excretory mass during and after delivery, that pregnancy itself when uncomplicated by toxæmia does not cause deterioration of renal function in women with essential hypertension or chronic glomerulonephritis. The present position would appear to be that pregnancy may be attempted by a patient with benign hypertension if a careful watch is kept for the development of toxæmia (œdema, increase of proteinuria and hypertension) and if the pregnancy is terminated early if this complication occurs early, and without too much temporizing if it occurs later in pregnancy (between the thirty-second and thirty-seventh weeks). The same conclusions would apply to chronic glomerulonephritis and nephrosclerosis, except that pregnancy should not be attempted if the renal disease has resulted in advanced renal insufficiency.

What is the fetal risk? Browne and Dodds<sup>(4)</sup> showed that if the systolic blood pressure at the start of pregnancy was 150 millimetres of mercury or over and the diastolic pressure 100 millimetres or over, the prognosis for the fetus was poor, and in their series only 32% of the children of such mothers survived. Most obstetricians will agree about the increased risk to the fetus, particularly in chronic glomerulonephritis.

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### HYPERTENSION AND ALLIED CONDITIONS IN PREGNANCY.<sup>1</sup>

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For practical purposes, hypertension in pregnancy is associated with one or more of the following conditions: (i) chronic glomerulonephritis, (ii) preeclampsia and eclampsia, (iii) essential hypertension, with which is included nephrosclerosis. Of these three conditions, chronic nephritis accounts for only a small proportion of the total.

#### Chronic Nephritis.

Dieckmann<sup>(2)</sup> states that chronic glomerulonephritis, nephrosis, pyelonephritis and other renal conditions make up less than 2% of the so-called toxæmias of pregnancy. There are several reasons for this. First of all, chronic nephritis is not a common disease. Secondly, women affected by it appear to have a decreased fertility rate. Thirdly, intrauterine death of the fœtus, with subsequent abortion or miscarriage, is of frequent occurrence in this disease. It is rare for any woman suffering from chronic nephritis of any severity to go to term and be delivered of a living child.

#### Preeclampsia, Eclampsia and Essential Hypertension.

I propose to discuss together preeclampsia, eclampsia and essential hypertension.

Dexter and Weiss<sup>(3)</sup> have defined toxæmia of pregnancy as "an acute vascular disorder characterized by the appearance in the latter half of pregnancy of (a) an abnormal elevation of blood pressure above the pre-pregnancy level (regardless of the presence or absence of hypertensive disease before the onset of pregnancy) or (b) an increase in the degree of albuminuria above the pre-pregnancy level in the absence of other obvious cause and (c) generalized oedema in association with the foregoing changes in the majority of cases, (d) a rapid diminution of these abnormalities before or soon after delivery".

This conception implies in particular two things: (1) A rise in blood pressure above the pre-pregnancy level is important. Thus, the woman whose systolic blood pressure rises from 110 millimetres of mercury to, say, 130 millimetres, is suffering from toxæmia, whereas the woman with a constantly high blood pressure, even if it is grossly elevated, is not. (2) It also suggests that the patient with essential hypertension, who has an increase of blood pressure during pregnancy, is suffering from a separate entity—preeclampsia—and not merely from an exacerbation of essential hypertension.

In this regard, it is important to recall Pickering's<sup>(4)</sup> statement that arterial hypertension is like constricted

pupils or an enlarged heart, no more than a symptom or sign of disease, and like them, may arise in more than one way. For example, there is evidence that the hypertension of preeclampsia and that of essential hypertension are basically different. In the first place, the symptomatology of the two conditions is so unlike. In the one, we have gross water retention with oedema, oliguria and often gross albuminuria, while in the other, oedema and albuminuria are absent, and frequently polyuria is present. In addition, many writers have drawn attention to important differences in the renal circulation in the two conditions, and Pickering<sup>(4)</sup> believes that in preeclampsia efferent glomerular dilatation is present, while in essential hypertension the same vessels are constricted.

In actual practice, there are two groups of toxæmic women. There are those in whom gain of weight, oedema and albuminuria are predominant and hypertension is less pronounced, while on the other hand, there are those in whom hypertension is pronounced, and the gain of weight, oedema and albuminuria, if present at all, are insignificant. It seems reasonable to regard the latter group as suffering from an exacerbation of their essential hypertension, rather than from true preeclampsia. Between these two groups there are varieties of mixed types, and in such cases it is often impossible to say which is the predominant element, the preeclamptic or the hypertensive.

There is no question that many patients with hypertension before pregnancy develop a toxæmia of pregnancy. Dexter *et alii*<sup>(5)</sup> give the figure as 50%, whereas they state that only approximately 6% to 7% of women with normal blood pressure before pregnancy develop preeclampsia or eclampsia.

Hypertensive cardio-vascular disease is a serious complication of pregnancy. It is serious, as we have seen, because of the greater risk of the development of preeclampsia or eclampsia, and the development of such a toxæmia in a patient already hypertensive tremendously increases the danger to herself. The exacerbation of the blood pressure of itself may produce any of the vascular catastrophes, cerebral or cardiac. Of these, left ventricular failure with acute pulmonary oedema is the one most frequently seen. In addition—and this applies also to the 50% of hypertensives who do not develop preeclampsia—the placenta of these patients are particularly liable to premature senility, with consequent death of the fœtus.

Eclampsia is to be regarded as the same disease as preeclampsia, with the addition of convulsions. Fishberg<sup>(6)</sup> regards these convulsions as a manifestation of hypertensive encephalopathy. It would appear that cerebral oedema plays a not insignificant role in the condition, and that the greater the generalized oedema present, the less the degree of hypertension necessary to produce convulsions and *vice versa*.

#### Sequelæ of the Toxæmias.

It is of interest to study the evolution of thought with regard to the remote prognosis of the toxæmias. As students, most of us were taught that when sequelæ occurred, they took the form of chronic nephritis. Then came the realization that nephritis rarely if ever occurred, and that toxæmic women were frequently left with hypertensive cardio-vascular disease, differing little, if at all, from essential hypertension.

Browne and Dodds,<sup>(7)</sup> in a follow-up of 400 patients in 589 pregnancies, showed that hypertension followed preeclamptic toxæmia in 50.9% of cases, but they concluded that "patients who develop residual hypertension after preeclamptic toxæmia or eclampsia have a familial tendency to the disease, which pregnancy has merely revealed and the onset of which the pregnancy has hastened, so that it sets in at an earlier period than it would have otherwise done". With this came the recognition of the extreme importance of actual or latent hypertensive disease as distinct from true preeclampsia, and Dieckmann,<sup>(2)</sup> in his excellent book published in 1941, stated that "for a number of years, I have believed that preeclampsia and true eclampsia do not cause permanent vascular or renal pathology, and that the patient who has such pathology would have had it eventually if she had never been pregnant". He believed that in those women with a predisposition to hypertension,

<sup>1</sup> Read at a meeting of the New South Wales Branch of the British Medical Association on June 28, 1945.

pregnancy may result in the onset of hypertension, which otherwise would not have appeared for years.

In 1942, Isenhour, Kuder and Dill<sup>(7)</sup> investigated the mean blood pressure and the incidence of hypertension in 900 parous and 900 nulliparous women, and this year Barnes and Browne<sup>(8)</sup> published comparable figures based on 915 parous and 1,041 nulliparous women. These two separate investigations failed to reveal any significant difference in the blood pressure of nulliparous and parous women. Barnes and Browne concluded from their figures that pregnancy does not cause hypertension and does not aggravate a tendency to hypertension; that though hypertension is a common remote sequel of toxæmia, it is not caused by the toxæmia; and that toxæmia of pregnancy may be regarded as a temporary disorder closely associated with pregnancy and leaving of itself no permanent lesion.

These are far-reaching conclusions based on an indirect method of investigation—conclusions which, to my mind, are not justified, as the incidence of toxæmia is relatively so low that even if all toxæmic women had a subsequent rise in blood pressure, it would have little effect on the mean blood pressure of the group. I therefore decided, possibly rather prematurely and certainly earlier than I had intended, to go into the results of my follow-up of patients at the King George V. Memorial Hospital who had suffered a toxæmia of pregnancy. At the outset I would make it clear that this must be regarded as being in the nature of a preliminary report; but it is at least a direct investigation of the pregnancies and subsequent condition of 46 toxæmic patients.

#### The Problem.

The essence of the problem is to ascertain whether patients who have suffered a toxæmia of pregnancy, have, after that toxæmia, a blood pressure which is higher than it was prior to pregnancy. It is out of the question in any considerable number of cases to have records of the blood pressure before pregnancy, so I have selected for this review those women who have had a toxæmia of pregnancy, whose blood pressure had been recorded at the antenatal clinic in the first trimester of pregnancy, and who have been kept under review after the termination of the toxæmic pregnancy for at least four months *post partum*. Most of these patients had been followed for much longer periods, the longest being thirty months. This early pregnancy blood pressure has been taken as a fairly reliable measure of the blood pressure before pregnancy, and has been compared with the follow-up figure. Apart from these limitations as set out, there has been no selection of cases, and all cases in which these records are available have been included in the series.

Of 46 patients, the blood pressure of two immediately before pregnancy was known. Thirty-three were examined at or before the tenth week of pregnancy, nine between the tenth and twelfth weeks, one at the thirteenth week and one at the fourteenth week.

While it may be objected that a follow-up covering only four months *post partum* is not long enough for the prospect of permanent damage to be assessed, longer follow-ups of some of the patients are not yet available. In any case, it is probable that by that time some evidence of permanent residual damage would have shown itself. It must also be borne in mind that if hypertensive changes do not manifest themselves for, say, twelve months *post partum*, it is questionable whether the toxæmic pregnancy has any bearing on those changes.

#### Criteria of Toxæmia.

For the purpose of this review, the criteria of toxæmia were a rise of systolic blood pressure during the pregnancy of at least twenty millimetres of mercury, or the appearance of albuminuria, or a combination of both occurrences.

#### Criteria of Sequela.

In assessing the results of the follow-up investigation, in every case in which a subsequent rise of ten millimetres of mercury or more in systolic blood pressure took place and was accompanied by a rise of ten millimetres of mercury in diastolic blood pressure, residual change was considered to be present.

#### Results.

With the above as a standard, of the 46 cases in 12 a subsequent rise in blood pressure occurred. In ten of these a subsequent rise of systolic blood pressure of 20 millimetres of mercury or more was present. Another case, in which a rise of 25 millimetres of mercury in diastolic pressure occurred without a rise in systolic pressure, has been included; this makes 13 out of 46 cases in which a subsequent rise in blood pressure occurred.

#### The Influence of Early Pregnancy Blood Pressure.

Of the 46 patients, 16 (average age 26.4 years) began pregnancy with a systolic blood pressure below 130 millimetres of mercury. Five of these showed a subsequent rise in blood pressure. Thirty patients (average age 27.9 years) began pregnancy with a systolic blood pressure of 130 millimetres of mercury or over. Of these, eight showed a subsequent rise in blood pressure. These figures support the opinion that toxæmia is more likely to occur in the woman who is initially hypertensive.

#### Severity of Toxæmia.

**Blood Pressure.**—In the 46 cases, the average rise in blood pressure during pregnancy was 41 millimetres of mercury (systolic) and 32 millimetres (diastolic). In the thirteen cases in which a subsequent rise occurred the average rise during pregnancy was 47 millimetres of mercury (systolic) and 33 millimetres (diastolic). Of the 46 cases, in three there was a rise of systolic blood pressure during pregnancy of less than 20 millimetres of mercury. These patients were regarded as toxæmic, because their urine contained respectively one-half, one-sixth and a heavy cloud of albumin. None of these patients showed a subsequent increase in blood pressure.

Seven had a systolic rise during pregnancy of 20 to 29 millimetres of mercury, and of these, one had a subsequent rise. Eight had a systolic rise during pregnancy of 30 to 39 millimetres of mercury, and of these, two had a subsequent rise. Ten had a systolic rise during pregnancy of 40 to 49 millimetres of mercury, and of these, three had a subsequent rise. Eleven had a systolic rise during pregnancy of 50 to 59 millimetres of mercury, and of these, five had a subsequent rise. One had a systolic rise during pregnancy of 60 to 69 millimetres of mercury, and she did not have a subsequent rise. Four had a systolic rise during pregnancy of 70 to 79 millimetres of mercury, and of these, one had a subsequent rise. Two had a systolic rise during pregnancy of over 80 millimetres of mercury, and of these, one had a subsequent rise. It therefore appears that the rise of blood pressure during pregnancy bears no significant relation to residual hypertension.

**Albuminuria: Maximum Concentration.**—Three patients had no albuminuria during pregnancy. None of these had a subsequent rise in blood pressure. Of fifteen patients whose urine contained a cloud of albumin during pregnancy, six had a subsequent rise in blood pressure. Of nine patients whose urine during pregnancy contained more than a cloud, and up to and including one-quarter albumin, three had a subsequent rise in blood pressure. Of eight patients whose urine contained more than one-quarter and up to one-half albumin, one had a subsequent rise in blood pressure. Of eleven patients whose urine contained more than one-half albumin, three had a subsequent rise in blood pressure.

It is interesting to note that of the fifteen patients whose urine contained only a cloud of albumin, six had a subsequent rise in blood pressure, whereas of eleven patients in whose urine the proportion of albumin was greater than half, only three had a subsequent rise in blood pressure. It seems likely that in the former the preclampsic element was at its minimum, and that they in reality suffered an exacerbation of essential hypertension, which was more likely to persist after pregnancy.

#### Duration of Toxæmia.

The estimation of the duration of toxæmia is always difficult, because it is frequently impossible to ascertain when the toxæmia first began; but as far as could be judged, nine patients were found to be toxæmic when admitted to hospital in labour. Two of these had a sub-



sequent rise in blood pressure. Ten others had a duration of toxæmia up to one week, and of these, two had a subsequent rise in blood pressure. A further eleven had a duration of toxæmia of two weeks, and of these, two had a subsequent rise in blood pressure. Eight more had a duration of toxæmia of three weeks, and of these, four had a subsequent rise in blood pressure. Finally, eight others had a duration of toxæmia of four weeks and over, and of these, three had a subsequent rise in blood pressure. Thus, in six cases in which a subsequent rise in blood pressure occurred, toxæmia was present for two weeks or less, and in seven cases in which a subsequent rise in blood pressure occurred, the duration of toxæmia was over two weeks.

It would appear that hypertension after pregnancy more commonly follows toxæmias of long duration than those of short duration, but it must be remembered that in patients predisposed to hypertension, the onset of toxæmia is likely to be earlier, and therefore the duration will be longer, than in those not so predisposed. The five patients with a duration of toxæmia of four weeks or over, who had no subsequent rise in blood pressure, suffered, if anything, from more severe toxæmia than those who did show such a rise in blood pressure. Altogether these figures do not provide sufficient evidence to support the contention that pregnancy should be terminated merely because a toxæmia lasts longer than three weeks.

#### Parity.

An analysis of the data under the heading of parity provides the most significant evidence obtained from the review. Of the 46 patients, 28 were *primiparae* and 18 were *multiparae*. Of the 28 *primiparae*, four had a subsequent rise in blood pressure, but only one of these had a rise greater than fifteen millimetres of mercury (systolic pressure); that rise was of thirty millimetres. Of the eighteen *multiparae*, nine had a subsequent rise in blood pressure. Of these nine, four had a subsequent rise of 20 millimetres of mercury, two had a subsequent rise of 25 millimetres, one had a subsequent rise of 30 millimetres, and one had a subsequent rise of 35 millimetres. The remaining patient had before pregnancy a blood pressure of 170 millimetres of mercury (systolic) and 100 millimetres (diastolic); at the end of eight months after delivery she had a blood pressure of 170 millimetres of mercury (systolic) and 125 millimetres (diastolic)—a rise of 25 millimetres in diastolic pressure without a rise in systolic pressure.

Of the nine *multiparae* with a subsequent rise in blood pressure, four had had one previous pregnancy, two had had two previous pregnancies, and one had had three previous pregnancies. There is good evidence that in all the previous pregnancies of these seven patients at least some toxæmic manifestation appeared. Of the remaining two of the nine *multiparae* who had a rise in blood pressure subsequent to pregnancy, one was in her seventh pregnancy, and the other was in her eighth pregnancy. The preceding pregnancies of these two patients had been apparently normal.

Of the nine *multiparae* who had no rise in blood pressure subsequent to pregnancy, five had had one previous toxæmic pregnancy.

It seems justifiable to conclude that while residual hypertension is unlikely to follow one toxæmic pregnancy, the advent of toxæmia in a subsequent pregnancy or pregnancies may give rise to a subsequent increase in blood pressure. The age factor comes into the problem, because the average age of the 28 *primiparae* in the series was 25.8 years, while the average age of the 18 *multiparae* was 29.7 years. However, the average age of the nine *multiparae* who had a rise in blood pressure after pregnancy was only 29.9 years—a difference which does not appear to be significant. Further, one *primipara*, aged forty-three years, had no rise in blood pressure after pregnancy.

#### Family History.

While one gained the impression that a considerable majority of the 46 toxæmic women had a family predisposition to hypertension, most people are so ill-informed about the health or even the manner of death of their

parents, that even the direct inquiries made met with answers which could not be assessed with any degree of accuracy.

#### Conclusions.

These figures as given point to certain conclusions:

1. That toxæmia is more common in patients who begin their pregnancy with an elevated blood pressure.
2. That the severity of the toxæmia, as indicated by the maximum rise in blood pressure during pregnancy, bears no significant relationship to the subsequent blood pressure.
3. That those patients who have a high concentration of albumin in the urine during pregnancy are not more likely to have an increased blood pressure *post partum*, and in fact, that the group with only slight albuminuria provided the greatest proportion of residual hypertensives.
4. That no definite evidence is obtainable that the duration of toxæmia as such bears any significant relation to the subsequent blood pressure.
5. That a rise of blood pressure is unlikely to follow one toxæmic pregnancy, but is quite likely to follow two or more such pregnancies.

#### Termination of Pregnancy.

Finally, let me say a word about the question of termination of pregnancy in essential hypertension. The foregoing review points to one definite fact, and that is, that a first pregnancy at least should never be terminated because of the risk of remote effects. This does not mean that a first pregnancy should never be terminated, but it does mean that there can be only two indications for the termination of such a pregnancy; the first is, when the life of the mother is likely to be or is endangered during the pregnancy, and the second is to preserve the life of the fetus. The danger to the mother during pregnancy can be assessed only after a careful history and examination of the cardio-vascular and renal systems. If this fails to reveal, apart from the hypertension, any significant departure from normal, it is the duty of the physician to allow the pregnancy to continue. Obviously, this is the pregnancy which must succeed—the next will be fraught with greater risk. Remember also that if there is an element of risk, the mother, being a woman, will probably prefer to take it than to remain childless.

As regards the fetus, remember that in these cases, foetal death in the latter weeks of pregnancy is an ever-present risk, and that termination of pregnancy at, say, the thirty-sixth or thirty-seventh week will frequently be the means of delivering a live baby, and may also forestall the appearance of an actual toxæmia.

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CLINICAL ASPECTS OF ORAL BACTERIOLOGY.<sup>1</sup>

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THE mouth was one of the first parts of the body to be investigated bacteriologically (Van Leeuwenhoek, 1674); but although it represents the portal of entry to both the respiratory and alimentary systems, it remained a Cinderella of bacteriological research until the very end of the nineteenth century. About 1890, W. D. Miller, an American dentist working in Berlin under Koch, during, as you will remember, a progressive era in bacteriology, published what was then an epoch-making theory of the cause of dental caries. He named it "The Chemico-Parasitic Theory", on the grounds that he had demonstrated certain groups of parasitic organisms which brought about chemical changes and disintegrated the tooth substance. The morbid anatomy of caries, as originally described by Miller and amplified by Sir Kenneth Goadby, Howard Mummary, G. V. Black and others, is essentially that used for clinical teaching today; but the pathology and bacteriology of the disease have commenced an entirely new story, which still has many chapters to run.

Only recently (1935-1936) has there been a scientific investigation of the distribution of oral streptococci, although their systemic toxic effects have been appreciated for many years. In 1900 Dr. Charles Hunter, following his work on pernicious anaemia, suggested that there was a link between oral and general health. He coined the term "oral sepsis", and together with Sir William Willcox and Sir Frank Colyer, wrote revolutionary papers (1900-1910) on what they termed "septic dentistry"; they pointed out the grave role oral sepsis could assume in producing systemic disease.

The mouth of the newborn infant, in common with the alimentary canal and respiratory passages, is sterile; but within a few hours various organisms make their appearance (from colostrum, from the skin of mother's breast and from kisses), and the cavity remains infected throughout life—it can never be rendered sterile. Organisms are not uniform in number or variety, but certain bacteria tend to become localized in specific regions, owing probably to anatomical and physiological conditions, such as moisture of the saliva and mucous secretions, temperature range, the existence of tonsillar crypts, and the stagnation of food debris around the teeth.

We have come to associate more or less characteristic floras with certain areas. For example, we speak of a nasal flora, an oral flora, a tonsillar flora and a pharyngeal flora. There is not a distinct line of demarcation between them, one flora merging into another; but in general, we know that the nasal passages become inhabited by a moderate number of Gram-positive and Gram-negative cocci, the oral cavity largely by Gram-positive diplococci and thread forms, and the crypts of the tonsils by both aerobic and anaerobic coccal forms unlike those on the tonsillar surface. The pharynx harbours Gram-positive and Gram-negative cocci, diphtheroids, and other bacilli. After the teeth have erupted (especially the permanent teeth), the mouth becomes more heavily infected; thread forms, fusiform bacilli and spirochetes make their appearance. These are associated with the various forms of gingivitis, which, in civilized communities, are more frequently the rule than the exception. When an adult mouth becomes edentulous, the oral bacteria diminish in number and variety.<sup>(1)</sup>

## Focal Sepsis.

Before proceeding further, let me quote Lord Horder's definition of focal sepsis. He defined focal sepsis as the term used to signify the presence of a local and chronic infection, itself yielding few or no symptoms, yet resulting in a state of toxæmia with or without a mild bacteriæmia,

and leading to a number of general or remote disturbances. Referring to "rheumatism", he has also stated that focal sepsis is certainly a causative factor in some degree, but that it does not follow that a panacea for the disease is to be found in the extirpation of the tonsils and teeth of the community. He is of the opinion that rheumatoid arthritis and other diseases of the rheumatic group are probably due in part to bacterial infection. From this aspect alone it is important to endeavour adequately to assess the effect of such conditions as unerupted impacted teeth, dental cysts, *pyorrhæa gingivæ* and Vincent's infection. In my experience every unerupted tooth sooner or later becomes a "liability" to the patient.

Some time ago I operated on a man, aged seventy years, who was suffering from a toxæmia resulting from a chronic osteomyelitis of the mandible associated with unerupted "canine" and bicuspid teeth; he had been apparently edentulous for many years. When he presented for treatment, his general condition indicated a bad operative "risk", and the surgical management of the case was attended by great difficulties.

Elective surgery, not emergency surgery, is the ideal in all cases of unerupted and impacted teeth.

The concept that dental cysts completely wall off their contained infection can no longer be substantiated; periodically toxic products escape into the blood stream, and these may, over a period, build up a sensitivity in the patient. As many as fourteen different strains of streptococci have been isolated from the apices of dead teeth, and frequently several strains can be grown from one tooth. Formerly, the so-called "open dental sepsis" (*pyorrhæa gingivæ*) was looked upon as a relatively less innocuous mouth focus; but now we know that under ordinary day-to-day conditions, the risk of escape of organisms into the blood stream from an apical lesion is not so great as from a *pyorrhæa* pocket. An apical granuloma is less liable to mechanical interference, unless the tooth is loose or the pulp canal is open, while a *pyorrhæal* ulcer is subject to constant trauma during mastication. However, in a case of extraction of an infected "dead tooth", there is no way in which a "bacterial shower" into the blood stream can be prevented. Such a bacterial shower can be responsible for the transient "flare-up" of, for example, a joint lesion after dental extraction. Brown and Hilton<sup>(2)</sup> make the following statement:

Oral sepsis may play an important part in producing infections via the alimentary canal. If achlorhydria already exists, the bactericidal effect of the HCl is lost; but in any case, oral sepsis may lead to gastritis, thereby diminishing or actually preventing the secretion of the acid.

Streptococci may also lodge in the crypts of the lining of the alimentary canal and set up inflammatory conditions of the mucosa. In pathological conditions of the eye, the effect of possible dental lesions should be ruled out. Iritis and iridocyclitis are notoriously associated with unerupted infected "canine" teeth, and it is well known that nothing is more likely to lead to post-operative complications after cataract extraction than the presence of one of the forms of oral sepsis.

In a consideration of the specific action of any organisms or group of organisms, the problem is not necessarily uncomplicated; other factors come into the question apart from the number and virulence of the bacteria and the local and general immunity of the patient.

## Symbiotic Phenomena.

Symbiotic phenomena have an important bearing in relation to the systemic effects produced by mouth organisms. Thus, while a patient suffering from dental sepsis may remain in apparent health, some additional toxic factor from an intercurrent infection may cause a pronounced manifestation of systemic disease. This is often seen when an attack of influenza leads to acute arthritis in a joint already affected by preexisting dental sepsis. In a similar manner oral sepsis, by means of its resulting toxæmia, may encourage the recurrence of general disease which would otherwise yield to quick treatment; for example, crops of boils (staphylococcal in origin) are

<sup>1</sup>A lecture given to a combined meeting of the Western Australian Branches of the British Medical Association and of the Australian Dental Association at the Perth Hospital on June 20, 1945. This article is also appearing in *The Australian Journal of Dentistry*, September, 1945.

apt to recur for long periods if dental sepsis is present. The removal of the dental focus frequently prevents further recurrence.

#### Selective Localization.

Selective localization is another factor which must be taken into consideration. Besredka stated that organisms attacking the body have sites of predilection; for example, the organisms of cholera, typhoid and dysentery primarily attack the mucosa of the intestinal canal; the virus of poliomyelitis affects the central nervous system via the upper pharyngeal or the intestinal mucosa; the organisms of vaccinia (cow pox), anthrax and variola (smallpox) enter the body through the skin. Besredka held that immunization of the site of predilection gave immunity to an animal without the necessity of producing antibodies in the blood stream. This was the basis of his theory of local immunity. (The guinea-pig is hard to immunize against anthrax, but its skin is the most vulnerable spot for infection by the bacillus (site of predilection). The animal can frequently be made immune to anthrax if a dead broth culture is applied repeatedly to a shaved spot of the skin.)

This predilection of organisms for a specific portal of entry into the body is known as "selective localization", and some groups of organisms select the mouth in this way, notably the viridans and hemolytic streptococci, Vincent's bacilli and spirochetes, *Corynebacterium diphtheriae* and the diphtheroids. For long periods they may be merely "waiting outside the door" as well-behaved saprophytes or potential pathogens; but with ecological changes they assume a virulent role and break through the natural barriers.

#### Elective Localization.

Rosenow, working in the Mayo Clinic about 1924, propounded the theory of "elective localization", which held that organisms isolated from a septic focus showed a striking affinity or "tropism" for various parts of the body. Thus, in the case of a patient with dental sepsis associated with a joint lesion, a culture of organisms taken from the affected dental area and injected into a suitable animal (for example, a rabbit) tends to produce arthritic changes in that animal. Similarly, if iritis is associated with dental sepsis, inoculation of a rabbit with the dental culture will tend to produce ocular changes.

This phenomenon of elective localization of bacteria (which may be compared loosely with the migratory flight habit of birds) was held by Rosenow to be presided over by some factor inherent in the bacterial cells; but local physio-chemical conditions of the body tissues must play some important part in determining the localization of any infecting organism. When an animal is injected intravenously with tubercle bacilli, innumerable lesions will be found in the lungs, but only minimal infection in the liver. The tubercle bacillus, which is highly aerobic, does not flourish in a low oxygen tension, and as the lung has the highest oxygen tension and the liver a low oxygen tension and high carbon dioxide tension, the distribution of the lesions is readily understood. (This, as you know, is the basis of the principle of treating tuberculosis by resting an organ. When the lung is made to collapse by pneumothorax the circulation is slowed down, the oxygen tension falls and the conditions for continued growth of the bacilli become unfavourable.) Professor D. P. D. Wilkie, C. H. Illingworth and A. L. Wilkie, of Edinburgh, confirmed the clinical application of Rosenow's work as regards gall-bladder disease;<sup>(1)</sup> but C. H. Kellaway was not successful in attempts to repeat Rosenow's experiments. Most of Rosenow's critics, while not criticizing or denying the validity of his data, look for the significant "localizing factor" in the tissues rather than in the bacteria themselves. (For example, it has been found that tubercle bacilli isolated from the kidney do not produce only renal lesions when injected into the animal; and the same is true of streptococci taken from a particular abnormal area.) Appleton<sup>(2)</sup> expresses the position as follows:

If Rosenow's work is correct, then the significance of the theory of "focal infection" is accentuated—if it is incorrect, the theory as a whole is not materially

weakened as the concept of elective tissue affinity represents at most a refinement which can exert no great influence upon a general basic conception of focal infection.

#### The Distribution of Oral Streptococci.

We have had a reasonably clear conception of the distribution of oral streptococci only since E. W. Fish and I. Maclean,<sup>(3)</sup> in 1935-1936, extended and amplified research carried out by Okell and Elliott (1935),<sup>(4)</sup> and by Round, Kirkpatrick and Halls (1935).<sup>(5)</sup> It has been known for many years that streptococci and a variety of other organisms can be grown from roots of extracted teeth, even though such teeth are vital. Also, material for cultural examination, taken carefully from the pulps of vital extracted teeth, or from the pulps of impacted unerupted teeth, frequently yield a growth. Histological examination of sections of these pulps reveals none of the inflammatory changes which are known to follow infection. This fact was confirmed by Fish after he had examined many hundreds of serial sections, and he pointed out the paradox of finding organisms in vital tissues, but without the histological evidence of the usual inflammatory changes one would expect. He therefore postulated that these organisms had only just reached the pulp prior to extraction of the tooth, and that they had in fact been pumped down the lymphatics of the periodontal membrane by the penetration of the beaks of the forceps and by the trauma necessary for the removal of the tooth from its socket.

Theoretically, if the gingival margins were intact (that is, if there were no evidence of gingivitis and no break in the epithelium), and if the forceps did not penetrate the gums, then there would be no pumping of organisms from the gum into the periodontal tissues. However, a patient with intact gingival margins and well-keratinized epithelium of the gingival trough is an extreme rarity in our present civilized communities; also it is impossible to extract most teeth without traumatizing the soft tissues with the forceps. Therefore, when a pyorrheal ulcer is present (on the tooth side of the gum), the pumping and sucking actions consequent on the use of the forceps must force the streptococci of the ulcer down the periodontal membrane. Some of these are sucked back into the pulp by the necessary rocking or rotation of the tooth; but others pass directly into the blood stream in the form of a "bacterial shower". This bacterial shower has been investigated by Okell and Elliott, who found that a transient bacteriemia was present after most dental extractions. It lasted only a few minutes, until the leucocytes and cells of the reticulo-endothelial system rounded up the organisms and disposed of them. The evidence of bacteriemia was proved by cultural examination of blood (from a vein in the arm) before and after extraction. Round, Kirkpatrick and Halls also proved that a transient bacteriemia could occur when patients with well-established pyorrhea gingiva merely ground their teeth together or chewed hard foodstuffs, the force of mastication being sufficient to pump organisms down the lymphatics of the periodontal membrane. The use of a local anæsthetic solution (with adrenaline) appears to reduce the bacterial showers, but does not eliminate them.

At first sight it is amazing, therefore, that serious sequelæ that follow dental extractions in unclean mouths are not more numerous, and we may well look for the reasons. As a dental student in Melbourne, I was privileged to attend lectures in surgery by Dr. Fay MacLure and one of his sayings remained indelibly in my memory: "The relatively large blood supply of the head and neck has kept many a dentist out of a coroner's court." Our present knowledge would make it rather unfair to specify only dental operations in this regard, because from the point of view of producing a "bacterial shower", ear, nose and throat surgery (as only one other example) may be equally dependent upon the relatively large blood supply of the area for its comparative immunity from embarrassing sequelæ.

The clinical significance of the "bacterial shower" produced by mouth operations (which must not be confused with septicæmia) is most important. In one Melbourne hospital recently there were at the same time three cases



of subacute bacterial endocarditis, and in all the honorary physician definitely determined the exciting cause to be dental extractions. It may be stated by some practitioners that they have never known of a case of bacterial endocarditis following dental extractions; but that is no argument, because these cases are still being admitted to general hospitals, and it is useless to "bury one's head in the sand". E. W. Fish has shown conclusively that if, just prior to extraction, a fine cautery is run round the gingival trough to sterilize any infection of the gingival tissues, the tooth can be extracted without the production of a bacterial shower; in other words, attempted culture of organisms from the blood is unsuccessful. The cautery must not cause hæmorrhage and the extraction must be expeditious. Therefore, this method of cauterization (or in an operating theatre, the less efficacious method of using pure carbolic acid on a fine probe) should be adopted when the patient's medical history is doubtful. Furthermore, the physician should consider the advisability of a pre-operative course of an appropriate sulphonamide. Fish<sup>(9)</sup> has also pointed out the following clinical applications:

A bacteriæmia must not be confused with a septicæmia. A bacteriæmia or bacterial shower is a transitory affair. The organisms thrust into the blood stream by an act of trauma (the extraction of the tooth) are soon destroyed. In septicæmia the bacteria are constantly present in the blood stream and multiply in some focus, such as a vegetation on a heart valve, from which the blood is constantly reinfected. Round, Kirkpatrick and Halls have shown that a very large proportion of people with advanced pyorrhæa get a bacteriæmia every time they eat hard or tough food. The danger cannot, therefore, be very grave or dramatic, and the reason is that the reticulo-endothelial system is a very efficient mechanism. It is found that within ten minutes of a bacterial shower of this kind into the blood stream, the blood has generally become sterile again and the organisms will be found in the phagocytic cells of the spleen and the Kupfer cells of the liver—well on their way to destruction.

The real danger seems to be that before the bacteria reach the liver or spleen they may lodge in some situation where they can conveniently multiply and establish themselves. If, for example, the patient receives a blow on the shin occluding a vessel in the bone at a moment when bacteria are passing along that vessel, an abscess or an osteomyelitis of the tibia may be set up (e.g., osteomyelitis in long bones of young children from a tonsillar focus).

Perhaps the most widely recognized danger of bacteriæmia occurs in children who are suffering from simple or rheumatic endocarditis—a disease from which in the ordinary way recovery is likely to take place. In this condition there are commonly small vegetations or masses of fibrin on the heart valves which might easily become infected, producing a fatal malignant endocarditis if there were organisms circulating in the blood stream.

The dental care of such children, if they have a septic mouth, is somewhat anxious. It seems wiser to delay the extraction of teeth with infected apices until the child is better, if that be possible, since nothing can prevent the danger of a bacterial shower from an apical lesion, though the administration of a sulphonamide or penicillin before operation would reduce the danger, and, of course, the gum margin should in any case be cauterized if extraction is considered necessary.

#### Puerperal Sepsis.

The work of Leonard Colebrook<sup>(10)</sup> at Queen Charlotte's Hospital, London, emphasized the danger of streptococci from the mouths of doctors and nurses to the parturient woman; but relatively little emphasis has been laid on the condition of the mouth of the patient herself. In the Dental Hospital of Melbourne we have an ante-natal clinic, the title of which has caused much amusement to numerous people on many occasions. As far as I know we have had only one birth in the building, and this was efficiently managed without my knowledge by two of the sisters; perhaps it was just as well, as it is a long time since I did my practical obstetrics course at the Rotunda! The establishment of this department was brought about some years ago, when I was approached by the then superin-

tendent of the Women's Hospital, Melbourne (Dr. A. M. Hill). In taking out his mortality figures over a period of twelve months, he found that there was no more than one death from one particular cause, except in the case of subacute bacterial endocarditis, from which there were two deaths. Post-mortem examination of these subjects demonstrated typical cardiac lesions, but no focus of infection except the mouth, which in each instance was described by the pathologist as "foul". It was postulated, therefore, that mouth sepsis was the exciting cause of death, and naturally Dr. Hill was extremely anxious to prevent a recurrence of such fatalities. Because difficulties of space and administration did not permit of the establishment of a satisfactory dental department at the Women's Hospital, we agreed to form an antenatal clinic at the Dental Hospital. This is now "fed", not only from the Women's Hospital, but also from the Queen Victoria Hospital, and the rule is that during the antenatal period the mouth of the expectant mother must be made free from sepsis, in order to help to prevent (i) post-partum morbidity, (ii) post-anæsthetic sequelæ, (iii) neo-natal infection of the infant by the mother's mouth.

E. W. Fish has drawn attention to another potential danger which does not appear to have been investigated as yet. During labour or light anaesthesia, a patient suffering from severe pyorrhæa may produce "bacterial showers" by grinding or clenching of the teeth.

If blood clots in the sinuses of the uterine wall which remain when the placenta is extruded, should contain organisms, it may not happen that the leucocytes in this clotted blood will survive long enough to destroy the bacteria, and puerperal sepsis may become established. It must be remembered, however, that if infected fresh blood be incubated (without first killing the leucocytes) one often fails to get any growth, and this phenomenon may explain why a great many women with severe pyorrhæa are saved from puerperal sepsis. The nature of the infection in puerperal sepsis, however, suggests that the source of the bacteriæmia may more often be the tonsil than the teeth.

#### Post-Anæsthetic Respiratory Sequelæ.

The incidence of "post-anæsthetic lung abscess" in Melbourne hospitals has decreased during the last decade. This has been due to a number of factors, including the following: (i) the improved type of anaesthesia which is being used more frequently for dental and oral surgery and ear, nose and throat operations (inhalational endotracheal technique of Magill); (ii) the improved technique for packing off the field in mouth operations; (iii) the institution of post-operative "stir up" treatment in the wards. However, post-anæsthetic sequelæ are still very much with us, and from time to time we are faced with complications, the origin of which is not covered by the usually accepted explanations (for example, the toxic form of acute stomatitis and pharyngitis which sometimes occurs after antrum operations). Therefore it may be pertinent to ask if there is no further method whereby we can endeavour to reduce their incidence.

The techniques mentioned above indicate attempts to combat what, after all, is the transference of oral bacteria into the respiratory tract during and after anaesthesia. It must be remembered that the ecological change brought about by such a spread is often responsible for the transformation of saprophytes into potential pathogens. Would it not be more logical, therefore, to try to eliminate as far as possible the "opportunistic" and pathogenic oral organisms, or at least bring them under control, prior to the induction of anaesthesia? Somewhat similar reasoning has been responsible for the inclusion of prophylactic mouth toilets as part of the nursing programme in typhoid and other exanthematous fevers, in order to prevent "ascending" infection of the parotid gland.

That mouth organisms can have a direct relationship to respiratory diseases (bronchiectasis and lung abscess) has been proved by E. E. Glynn<sup>(11)</sup> and N. E. Heath.<sup>(12)</sup> I venture to suggest that in the average hospital ward at least 25% of the patients, excluding edentulous patients, have a high grade of mouth sepsis which, *per se*, is capable of initiating some form of post-anæsthetic respira-

tory complication. That such a sequel frequently cannot be definitely determined as due to mouth sepsis is no argument for ignoring the fact that the oral bacteria probably have been at least a contributing cause—perhaps even the extra straw on the camel's back. I have been told that the late Lord Moynihan refused to carry out any gastric surgical operation without previously having mouth sepsis eliminated.

Except in cases of emergency surgery, every patient should undergo thorough oral prophylaxis prior to general anaesthesia. At the Dental Hospital of Melbourne, all patients for general anaesthesia must undergo oral prophylactic treatment at a previous visit, and there is a similar routine instruction for patients referred from the Dental Hospital to my beds at the Alfred Hospital. In all cases of elective surgical treatment under general anaesthesia, there should be no excuse for inviting, let alone aiding and abetting, the risk of post-anaesthetic sequelae by not having the mouth put in a satisfactory state beforehand. (This even applies to such operations as the dissection of tonsils under local analgesia, in which the presence of the "cough reflex" has been found not to be the perfect guard against the inhalation of adventitious material.) This contention is another strong argument for the appointment of resident dental officers on the staff of every general hospital. With such appointments, even emergency surgical patients could be given the benefit of some pre-operative mouth prophylaxis.

#### Vincent's Infection.

Vincent's infection varies from the smouldering, almost painless, chronic lesion in the mouth of a heavy cigarette smoker, to the extensive destruction of the gum tissues, alveolus, cheeks and lips seen in "New Guinea mouth". It never occurs in an edentulous mouth with intact mucous membrane. It was not known as a clinical entity before the last war, and the term "trench mouth" was coined because of its occurrence in men who had served for long periods in the trenches. Carriers are well known, and although there is abundant evidence to prove the spread of contagion, practically all experimental attempts to transfer the disease from infected human mouths to healthy human mouths have failed.

Bacteriological examinations of most mouths, from adolescence onwards, will demonstrate fusiform bacilli and spirochaetes in varying numbers and in varying proportions of bacilli to spirochaetes. It must be stressed that quite a number of types of spirochaetes are found in the mouth,<sup>1</sup> and also that there are many short thread forms which may simulate *Bacillus Vincenti*. The two specific organisms, however, demonstrate a classical example of symbiosis (although some workers, for example, R. Tunnicliffe,<sup>2</sup> consider that they are just different stages of the same organism). In the average mouth they are nothing more than loosely related saprophytes; but with the occurrence of ecological changes they may join forces in earnest and become pathogenic. They are frequently present in a state of low-grade virulence in gingivitis, and they are notorious for producing a smouldering infection under the soft-tissue flap which covers part of the crown of an impacted wisdom tooth. Upon trauma (for example, the removal of such a tooth) the infection lights up and becomes acute and fulminating, and a general toxæmia ensues.

William C. Black holds that the *herpes simplex* virus is the primary aetiological agent in Vincent's infection; and that the spirochaetes and bacilli are secondary invaders.<sup>3</sup> This, however, has not received general confirmation; but it is well known that Vincent's organisms are present, probably as secondary invaders, in bronchiectasis and lung abscess. Vincent's infection of the mouth may pass back and infect the tonsils, but rarely, if ever, does the disease pass from the tonsils to the mouth. The reason for this is explained, at least in part, by the direction of the normal "swallowing tide" from the mouth to the pharynx.

Curiously enough, the bacteriology of "tropical ulcer" is essentially that of Vincent's infection of the mouth. The aetiology of tropical ulcer is briefly as follows. The natives have their legs and arms scratched when walking through jungle undergrowth; they meet in communal huts and spit freely and heartily on the floor as a sign of good manners and as an appreciation of good fellowship. Most natives of the islands to the north-east of Australia suffer from a "marginal" gingivitis, which is due partly to periodical vitamin C deficiency and partly to gingival trauma consequent on continuous chewing of betel nut. Many have a chronic low-grade Vincent's infection, and their saliva contains copious quantities of the specific organisms. When these enter an abrasion on the skin of another native, who is squatting on the floor of a hut, they attain a high degree of virulence and an ulcer is initiated. Dr. Holland, who was medical officer at Kaeviang before this war, described to me a treatment which he found effective, and curiously enough, this is in line with treatment we give in the mouth. The ulcer is bathed in a solution of an oxidizing agent (for example, eusol) and then an alcoholic mixture of crystal violet and methylene blue is applied. One injection of 0.6 gramme of "Novarsenobillon" is given at the beginning of treatment, but is not repeated. "Novarsenobillon" injections will arrest but will not cure the condition, and this, of course, may apply to Vincent's infection of the tonsil, in which 0.6 gramme of "Novarsenobillon" will sometimes bring down the temperature and give the patient comfort, but will not effect a lasting cure. However, in all cases in which Vincent's infection is confined to the mouth, "Novarsenobillon" injections are useless in treating the disease, as so many of the organisms are confined to a necrotic nidus which is extravascular.<sup>4</sup> Vincent's organisms may be compared to the epithelial cells of a cyst lining, in that, unless they are totally eliminated, there will be a recurrence of the condition. Therefore, one should be chary of accepting stories of quick cures; they may be apparent cures, which mask a quiescent or smouldering infection. The only way to be certain of cure is to carry out adequate careful instrumentation and local medication (the application of hydrogen peroxide followed by chromic acid 10%) throughout the whole mouth, and check the result periodically with bacteriological examination until "negative" smears are obtained. It is dangerous to carry out extractions until the infection is controlled, owing to the risk of acute toxæmia. Incidentally, smoking must be entirely prohibited.

In the diagnosis and treatment of Vincent's infection of the mouth, clinical and bacteriological methods must go hand in hand. As a general rule it is unwise to make a diagnosis from a smear only, especially if one has not made the smear oneself. Many cases are falsely labelled as of Vincent's infection on sketchy bacteriological evidence by a bacteriologist who has never seen the patient. The converse must also be admitted—that is, that many diagnoses of "fuso-spirillary gingivitis" have been made on clinical grounds only, when a smear would have disclosed a streptococcal gingivitis to be present; this, of course, is a rather serious mistake, as the treatment for the two conditions is different.

The idea of a "positive" smear "running riot", as it were, was quoted by Hirschfeld,<sup>5</sup> who reported two instances in the United States of America, "where almost an entire hospital staff, including nurses and attendants, were subjected to a series of intravenous injections (of arsenicals) only because of 'positive' bacteriological findings after the clinical diagnosis of Vincent's infection in a nurse of one of the patients"; that, of course is doing things in a big way! It is far simpler to isolate the patient, together with his eating utensils and linen.

In a smear indicating Vincent's infection, at least ten to twenty typical bacilli are seen in an oil-immersion field, and spirochaetes are in abundance. Spirochaetes alone, or with relatively few bacilli, or with "phantom" bacilli, are not sufficient data upon which to make a positive bacteriological diagnosis (J. M. Lewis); however, clinical signs and symptoms may be sufficient to indicate that in the case of a "doubtful" smear the examination should be

<sup>1</sup> *Treponema Vincenti*, 20  $\mu$   $\times$  0.3  $\mu$ , 20 spirals; *Treponema buccale*, 7 to 25  $\mu$   $\times$  1.0  $\mu$ , 3 to 5 spirals; *Treponema macrodentum*, 10 to 25  $\mu$   $\times$  0.5  $\mu$ , 8 to 12 coils; *Treponema microdentum*, 5.0 to 12  $\mu$   $\times$  0.5  $\mu$ , 8 to 12 coils; and many others.

repeated. As the disease defervesces or is controlled, smears show a decreasing proportion of bacilli and a change in type to the "phantom" form. As both the specific organisms are essentially anaerobes, it is rational to prescribe mouth washes containing oxidizing agents, such as esul or hydrogen peroxide, as part of a treatment programme. This is one of the relatively few occasions when a patient can be trusted with hydrogen peroxide mouth washes. To prescribe hydrogen peroxide after dental extractions, for example, is irrational and dangerous, because it dissolves the blood clot which, after all, is nature's protective splint for the tooth socket.

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## Reports of Cases.

### A POSSIBLE CASE OF PELLAGRA.

By A. M. WATKINS, M.B., B.S. (Melbourne),  
Roseville, New South Wales:

#### Clinical Record.

I was consulted by S.M.P., an unmarried female patient, aged sixty-five years, who had been suffering from diarrhoea, progressive loss of weight and difficulty in walking for the past six months. At times during this period her neighbours and friends became anxious about her, as she was wandering from home and would go out unclothed talking to imaginary people, upbraiding them for injuring her.

On examination, she was extremely emaciated; the conjunctivæ were startlingly clear, and on the backs of the hands, the cheeks, the chin and the lips was present a rough, scuffy and slightly pustular rash. The diarrhoeal stools were extremely foul, the condition alternating with constipation, and great exhaustion was present. The whole cutaneous system was dry. No elevation of temperature was present, occasional vomiting occurred and the tendon reflexes were sluggish. The systolic blood pressure was 140 millimetres of mercury and the diastolic pressure 84, and X-ray examina-

tion of the gastric tract revealed no abnormality. The appearance of the conjunctivæ, the dermatitis on the exposed parts and the dementia and diarrhoea together pointed most strongly to the diagnosis of pellagra.

In spite of the exhibition of nicotinic acid and tomato juice and supportive treatment, the patient rapidly succumbed.

#### Comment.

In this case the dementia appeared first, followed by wasting and diarrhoea; but the dermatitis appeared only in the last ten days of her illness. Her diet for years had consisted of mostly bread, butter and tea, with porridge and occasionally a little stew. This was most monotonous.

The causative factors in pellagra are considered to be five in number: (a) avitaminosis, (b) poor dietary, (c) infection, (d) bad liquor, (e) excessive exposure to the sun. In this case all were not present, for there was no infection and no alcohol had ever been taken; but the diet was deficient, and there had been excessive exposure to the sun, for the patient had never worn a hat and had sat in the sun for hours at a time. No individual theory meets all the requirements, and any one of them may be ruled out of court on particular points; but through all cases there runs a combination in different proportions of the factors (a), (b), (c), (d) and (e). Where the truth lies is uncertain; perhaps it may rest upon different combinations of which (a) and (b) are primary, the last three being contributory, not to the complete syndrome, but to the particular parts thereof. Ibalum Sabry, of Alexandria, Egypt, has postulated a toxin dioxiphenylamine derived from maize beans and other grains and artificial liquors. He points out that pellagrins in the country consume large quantities of maize, but no liquor, whilst in the cities pellagrins do not eat maize, but consume bad beans and bad liquor which is made from maize.

In Joseph Meakin's "Modern Medicine" the statement appears that if the symptomatic triad of diarrhoea, dementia and dermatitis is present, the diagnosis of pellagra should never be in doubt.

### A CASE OF "MAPHARSEN"-RESISTANT SYPHILIS.

By J. V. GORDON,

Captain, Australian Army Medical Corps.

#### Clinical Record.

PRIVATE P., aged thirty-five years, was admitted to hospital on December 27, 1944, with a history of having noticed a painless sore on his penis during the previous seven days; he had treated it himself with "Mycosol" paint and tinea powder. He denied any previous exposure to infection. On examination, a round, painless ulcer was seen on the prepuce; its diameter was about three-quarters of an inch, there was no undermining of its borders, and it had a firm indurated base. A few enlarged discrete glands were palpable in his left groin. A dark-ground illumination examination revealed a few spirochaetes, but rather atypical for *Treponema pallidum*. The Kline test produced a weakly positive result. In view of the history and inconclusive dark-ground findings, it was decided to perform a biopsy to exclude an epithelioma. This revealed a granuloma with surface ulceration, the tissue consisting of proliferating fibroblasts, numerous new vessels, and infiltration with lymphocytes, plasma cells and large mononuclear cells, and the result was considered compatible with a primary chancre.

He was forthwith started on a course of bi-weekly intravenous injections of "Mapharsen", the first dose being 0.04 gramme and subsequent doses 0.06 gramme. After eight injections—at total of 0.46 gramme—the patient noticed a rash on his body. Examination revealed an extensive, symmetrical papulo-squamous rash, ham-like in colour with a round or oval contour, and non-irritating, affecting the whole trunk and extremities including the palms of the hands. The patient felt well. The rash was typical of a secondary syphilitic eruption, but no other secondary lesions could be detected. However, in view of the previous "Mapharsen" therapy it was decided to suspend further arsenical injections, and he was given daily intravenous injections of sodium thiosulphate. After seven injections the rash had not diminished, but indeed appeared more profuse, although there was no associated irritation. A Kline test at this time produced a fairly strong positive result.

It was now thought likely that he was resistant to "Mapharsen", and that the rash was a manifestation of secondary syphilis. Other patients treated for primary



chancres from the same batch of "Mapharsen" responded well. Intravenous injections of "Neosarsphenamine" were commenced; the first dose was 0.4 gramme and subsequent doses 0.6 gramme. After three injections of "Neosarsphenamine" the rash began to fade and finally disappeared.

#### Comment.

Summarizing, one can say that it seemed highly probable that the patient had a primary chancre, followed four weeks later by a secondary syphilitic rash despite intervening "Mapharsen" therapy, which was immediately cleared up by intravenous injections of "Neosarsphenamine". Arsenical dermatitis was considered improbable, in that the eruption was not typical of this condition, did not diminish on suspension of arsenical treatment, and was subsequently cured with "Neosarsphenamine". It certainly appeared as if this was a genuine case of "Mapharsen"-resistant syphilis.

#### Acknowledgement.

The Director-General of Medical Services has kindly permitted publication of this case.

### Reviews.

#### A YEAR BOOK ON NEUROLOGY, PSYCHIATRY AND ENDOCRINOLOGY.

"THE 1944 YEAR BOOK OF NEUROLOGY, PSYCHIATRY AND ENDOCRINOLOGY" is a valuable work.<sup>1</sup> The editors for the three parts of the work are respectively H. H. Reese, N. D. C. Lewis and E. L. Sevringhaus. In these three parts will be found reference to articles dealing with these subjects that have appeared during the year in journals in different parts of the world. The reference is in the form of an abstract and the work described may or may not be entirely new. If it is not new it has a bearing on recent investigations. Clearly by reading a book of this kind a practitioner may keep himself well informed of what has been written on the subject in which he is interested. He is helped in his judgement by means of footnotes added here and there by the editor of each section. In a discussion on such a work it is clearly impossible to review its contents; to do this in an adequate way would mean a review of the whole subject concerned. All that can be done is to give an idea of the ground covered and an opinion regarding the wisdom of the choice in subjects. Of the latter there can be no doubt. The part of the volume given over to neurology deals first of all with anatomy, physiology and pathology; then follows a section on allergy, headaches, migraine and the epilepsies. The third section deals with disorders of the central nervous system and the fourth with diagnostic procedures. The part of the book devoted to psychiatry is divided into nine sections, of which the most interesting appear to be those dealing with child psychiatry and military psychiatry. The field of endocrinology is continually enlarging; the editor of the part devoted to endocrinology points out that progress in the clinical side of the subject is of most value to the clinician who thinks in terms familiar to the physiologist. The 270 pages in this part of the book are crammed full of useful information. This book contains much that will interest the general practitioner as well as the specialist.

#### A YEAR BOOK ON DERMATOLOGY AND SYPHILOLOGY.

THE editor of "The 1944 Year Book of Dermatology and Syphilology" is Dr. Marion B. Sulzberger, who has as assistant Dr. Rudolf L. Baer.<sup>2</sup> The volume is one of the "Practical Medicine Series" of year books, a series that is well and favourably known to Australian practitioners of

<sup>1</sup>"The 1944 Year Book of Neurology, Psychiatry and Endocrinology", edited by Hans H. Reese, M.D., Nolan D. C. Lewis, M.D., and Elmer L. Sevringhaus, M.D.; 1944. Chicago: The Year Book Publishers Incorporated. 7" x 4½", pp. 712, with many illustrations. Price (Australian): 22s. 6d.

<sup>2</sup>"The 1944 Year Book of Dermatology and Syphilology", edited by Marion B. Sulzberger, M.D., assisted by Rudolf L. Baer, M.D.; 1945. Chicago: The Year Book Publishers, Incorporated. 7½" x 5½", pp. 544, with 75 illustrations.

medicine. This volume, like other members of the series for 1944, has had to be produced in accordance with the requirements of the War Production Board of the United States. Though the appearance of the book may have suffered somewhat, it is just as satisfactory a production as ever. The editors state in the introduction that military life and the problems of military medicine have given an unusual impetus to dermatology and have demonstrated anew the importance of a study of the skin. They have attempted to cover the ground of the year's work in the literature and the result is worthy of the attention of all dermatologists. The only part of the book not based directly on articles from current journals is the opening article which is the second part of a discussion by the editors on skin tests. The first part appeared in "The 1943 Year Book". The present article deals with patch tests, scratch tests and intracutaneous tests. The book, as usual, is divided into several parts. The sections deal in turn with therapy (exclusive of venereal diseases), X-ray and other physical therapy, eczematous dermatitis and urticaria (allergic and non-allergic), and allergy, drug eruptions, miscellaneous haematogenous dermatoses, other dermatoses, cancer, precancerous and other tumours, *mycosis fungoides* and Hodgkin's disease, fungous infections and other infection. These sections are followed by a long section on venereal disease (gonorrhoea is not included). Syphilis is dealt with from several aspects. *Lymphogranuloma venereum* is mentioned as one of the "other" venereal diseases and a welcome section is that dealing with public health and venereal disease control. In the last-mentioned section some important material is found, including reference to a civilian committee on venereal diseases founded by Negroes in America. The section last but one in the book is probably its most important—it deals with recent dermatological investigations.

#### A YEAR BOOK IN OBSTETRICS AND GYNÆCOLOGY.

"THE 1944 YEAR BOOK OF OBSTETRICS AND GYNÆCOLOGY" is edited by J. P. Greenhill.<sup>3</sup> It is one of the Practical Medicine Series of Year Books, many of which have been reviewed in these pages. The first half of the present volume is devoted to obstetrics. In regard to pregnancy, there are references to physiology, abortion, complications and toxæmia. Under the heading of "complications" will be found abstracts of articles on anæmias of pregnancy, on the heart in pregnancy and labour, on hyperthyroidism, on tuberculosis, on penicillin in the treatment of syphilitic pregnant women, on *diabetes mellitus*. Several contributions have dealt with the toxæmias. In the section on labour extensive reference is made to caudal anaesthesia. In an appendix to a reference to use of the hypnoidal state in obstetrics, the editor states that it is unfortunate that most practitioners regard hypnosis as charlatanism. This is not true of Australia, though the use of hypnosis has not been advocated in obstetrics. In an interesting section on the newborn, congenital defects in infants following infectious disease of the mother in pregnancy are mentioned, reference being made to the Australian observations and to observations in America.

The half of the book devoted to gynaecology is divided into sections covering diagnosis, sterility, ectopic pregnancy, operative technique, benign tumours, malignant tumours, special tumours of the ovary, menstruation and its disorders, endocrinology and infections. Of these the most interesting is that on menstruation—it is dealt with from every point of view. But in every section every medical practitioner will find something to interest him.

#### CORRIGENDUM.

IN the issue of August 18, 1945, in a review of J. J. Abraham's book, "Lettsom and His Times", it was stated that he was the founder of the Royal Society of London. This was a misprint for the Medical Society of London. Lettsom was elected a Fellow of the Royal Society in 1773, the same year in which he founded the Medical Society of London. Our copy of the book was received from Angus and Robertson, Limited, Sydney.

<sup>3</sup>"The 1944 Year Book of Obstetrics and Gynecology", edited by J. P. Greenhill, B.S., M.D., F.A.C.S.; 1944. Chicago: The Year Book Publishers Incorporated. 7" x 4½", pp. 576, with many illustrations. Price: \$3.00. Australian price: 23s. 6d.

# The Medical Journal of Australia

SATURDAY, SEPTEMBER 1, 1945.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

## THE EIGHTH INTERIM REPORT OF THE PARLIAMENTARY JOINT COMMITTEE ON SOCIAL SECURITY.

THE Joint Committee on Social Security was appointed by resolution of the Commonwealth Parliament on July 3, 1941, "to inquire into and, from time to time, report upon ways and means of improving social and living conditions in Australia, and of rectifying anomalies in existing legislation". It has presented seven interim reports and the eighth has recently appeared. The subjects with which these reports have dealt, have, in the order of their appearance, been as follows: "Social Security Planning and Legislation", "Unemployment and the War Emergency", "Consolidation of Social Legislation and Post-War Unemployment", "Housing in Australia", "Reconstruction Planning", "A Comprehensive Health Scheme", "A Commonwealth Hospital Benefit Scheme; Hospitalization; Consolidation of Social Legislation". The eighth report breaks but little new ground; it is largely a restatement of the opinions of the members of the committee, but it does emphasize in no uncertain way important points of view and serves the additional purposes of bringing to the notice of Parliament the report of the Medical Planning Committee and the recommendations of the International Labour Conference, Philadelphia, 1944, concerning medical care. The report of the Medical Planning Committee, it will be remembered, has been discussed by the Federal Council (Sir Henry Newland, President of the Federal Council, was one of its two signatories, Mr. H. C. Barnard, Chairman of the Joint Committee, being the other), and it was published in *extenso* in this journal on September 9, 1944. The recommendations of the International Labour Conference are of importance to the Joint Committee on Social Security not only because of the matters with which they deal, but also because its chairman, Mr. H. C. Barnard, was one of the Australian delegates to the conference. The sixth interim report of the committee was published in full in this journal in the issue of July 17,

1943; it was signed by H. C. Barnard, W. J. Cooper, J. J. Arnold, M. Blackburn, J. A. Perkins and R. S. Ryan. The sixth report was admitted to be incomplete, and it was recommended that the investigations should be continued at some future date. The committee also thought that the subject of a complete health service for Australia should be discussed by it with interested parties such as the medical profession and the National Health and Medical Research Council. It was at this time that Parliament was dissolved. When a new Parliament had been elected another Joint Committee on Social Security was appointed. Mr. H. C. Barnard was again chairman, Senator W. J. Cooper was deputy chairman and Mr. R. S. Ryan was a member; the new members were Senator D. M. Tangney, Mr. F. M. Daly, Mr. L. C. Haylen and the Honourable Sir F. H. Stewart. The new committee decided to proceed with the conference, and it was held in December, 1943. Representatives of the medical profession attended, and the medical directors of the three services and the medical members of the Medical Survey Committee appointed by the Joint Committee on Social Security were also present. Dr. J. H. L. Cumpston represented the National Health and Medical Research Council. This conference appointed the Medical Planning Committee, whose report, as already mentioned, was published last September.

In the present (eighth) report, the Joint Committee on Social Security points out that the Medical Planning Committee in its report dealt with many of the subjects referred to by the Joint Committee in its sixth interim report as requiring further consideration. But there has been a rift in the relations between the Minister for Health on the one hand and the Parliamentary Joint Committee on Social Security on the other. Where peace, harmony and collaboration might be expected to thrive, there is talk of discourtesy, futility and so on. It has happened on this wise. In June, 1944, the Minister for Health, Senator the Honourable J. M. Fraser, on the recommendation of the National Health and Medical Research Council, invited the Federal Council of the British Medical Association in Australia and representatives of the Royal Australasian Colleges of Physicians and Surgeons to meet in conference with the members of the National Health and Medical Research Council, "with the object, if possible, of arriving at agreement as to the form which improved medical services to the people might take". This conference was held and a committee was appointed to confer with the Minister and other government representatives. As stated in the eighth interim report, no reports of these meetings were issued and no formal resolutions were adopted; only informal discussions took place. The Joint Committee regards the action of the Minister in calling the conference of June, 1944, as discourteous to the committee and unfortunate in its results. The conference, we read, was called without reference to the Joint Committee and it was not informed what was taking place. "The action has side-tracked the work of the Committee and it is now evident that no useful purpose can be served by further investigations on the part of the Committee, while the matter is being handled by the Government directly with the medical profession." The Joint Committee adds that it is clearly impossible for the medical profession to carry on discussion concurrently with the committee and a department of the Government. With this we agree. The

committee thinks that a feeling has been created in the medical profession that its discussions with the committee have been wasted. While some persons may hold this view, we do not believe that it is widespread. On the contrary, many members of the medical profession hold that the Parliamentary Committee on Social Security has done most useful work *inter alia* in helping the medical profession to state its views and to formulate its opinions. The report of the Joint Committee's Medical Planning Committee shows to what extent opinions of fundamental importance are shared by the medical profession and members of Parliament. That the Joint Committee is prepared to emphasize aspects that need emphasis we now propose to show.

The sections of the eighth interim report deal successively with health centres, hospital services, specialist services, maternal and infant welfare, child welfare, mental health, almoners and trained social workers, flying doctor and air ambulance services, dental health services, optical services, the effect of war service on doctors and nurses, the constitutional position and the International Labour Organization. There is also a section entitled "Conclusion". This shows the general attitude of the Joint Committee and its clauses are as follows:

1. Preventive medicine should have priority over remedial medicine in any scheme of national service.
2. The construction and servicing of appropriately placed hospitals and sanatoriums should be regarded as of first priority.
3. Planning of medical services should proceed, but no general change should be made until after the war.
4. Cooperation and goodwill should prevail between the Government and the medical profession.

A spokesman of the British Medical Association in Western Australia was reported recently as having stated that the medical profession had always maintained that first things should be placed first. This the Joint Committee has done. Apparently it also believes in the truth of another statement made by the British Medical Association spokesman, that no matter how lavish might be government expenditure on medical services, it would always be necessary to spend the money wisely. This is clear from the unequivocal statement of the Joint Committee in regard to hospital services—"that the first and most urgent call on any fund should be the making good of all deficiencies in accommodation in hospitals, that the immediate and cheapest solution lies in overcoming the glaring deficiencies in accommodation for sub-acute and chronic diseases, and for the evacuation of these patients from acute hospitals with resultant lowering maintenance costs". Nothing could be clearer than this. It does in actual fact put first in urgency the need for the solving of a problem that is becoming greater every day. Here is no mention of what has become known as "free medicine" and this in spite of the fact that the majority of members of the Joint Committee belong to the Government that is fathering the measure, knowing and admitting that it has endowed the whole scheme with nothing likely to be of any benefit to the health of the community. The members of the committee have studied the needs of the community. They have been so insistent on the need to overcome "glaring" deficiencies because of three opinions that they hold. The first is that every patient in Australia who in the opinion of his medical attendant needs hospitalization, should be assured of immediate admission to a hospital suitably equipped for the treatment of his dis-

ability. The second is that every medical practitioner should have facilities for treating his patients in his local cottage or district hospital for such illnesses and injuries as do not require transfer to a base hospital for specialized treatment. The third opinion is that it is the duty of those charged with the medical care of the people to ensure that sufficient hospital beds, adequately equipped and staffed, are available to meet the requirements for immediate admission to hospital of all the sick and injured. It can be stated without fear of contradiction that anyone who studies the hospital problem of Australia with the health of the people as a "special intention" will form opinions similar to those of the members of the Joint Committee and will, as they do, push them as a "first priority".

Some of the other conclusions of the committee must be mentioned. The committee, believing that medical service should be available to those who need it, supports the views and general proposals of the Medical Planning Committee in regard to the provision of medical service for remote areas, as well as for the country and metropolitan districts. It endorses the recommendation that experimental group practice centres should be established, and thinks immediate steps should be taken in this direction. Again, the committee endorses the views of the Medical Planning Committee in regard to specialist services in remote areas and in country areas and in regard to specialist services generally. It also thinks that the principle at present applied in Queensland for the registration of specialists should be adopted throughout the Commonwealth. In regard to maternal and infant welfare, the recommendations of the Medical Planning Committee are also endorsed. In the sphere of child welfare the committee thinks that there should be adequate medical examination of school children, with provision of medical treatment, that miniature X-ray examinations should be made for the detection of physical defects, that a personal record card index system covering the child through to school-leaving age should be established, and that arrangements should be made for the introduction of a "free and cheap milk" scheme on the lines of that in vogue in Great Britain. The recommendations in regard to mental health include one concerning a survey by competent experts into the problem of mental deficiency and mental illness throughout the Commonwealth. This section and that dealing with dental health deal with such enormous problems that they call for special discussions on another occasion. The remaining sections have been mentioned and must be passed by at present.

In presenting this "final and necessarily incomplete" report in regard to a national medical service, the Parliamentary Joint Committee on Social Security has adopted a dignified attitude in view of its opinion that its work has been side-tracked by the Minister and that no useful purpose will be served by any further investigations it may make. One fact remains to be stated—we accept the committee's view as a fact—and it has to do with the constitutional position. Constitutional difficulties are likely to be encountered in the introduction of an Australia-wide comprehensive health service. The considered opinion of the committee is that "the successful introduction of any such scheme can be accomplished only after discussions between the Commonwealth and State authorities, the medical profession and other interested parties have resulted in mutual agreement".



## Current Comment.

### ASTHMA AND PENICILLIN.

PHYSICIANS who are called upon to treat patients suffering from asthma know only too well that it is not always easy to determine whether the condition is due to some air-borne or ingested substance or whether it is caused by some acquired bacterial infection. While some children with a predisposition to asthma—children with an allergic soil, as it has been called—suffer from uncomplicated extrinsic asthma and may continue to do so for many years, they may, as they grow older, gather for themselves a bacterial infection, and this is quite likely to accentuate the asthmatic condition. In other words, they now suffer from intrinsic as well as extrinsic asthma. Sometimes in these circumstances the extrinsic asthma may with the passage of years wear itself out, to use a colloquial expression—the intrinsic factor predominates. Since penicillin has been found effective in many conditions occasioned by certain organisms, it is not surprising to find that it has been given to patients with intractable asthma. A "preliminary report" on this type of therapy has been made by S. S. Leopold and R. A. Cooke.<sup>1</sup> They write from the medical division of the Hospital of the University of Pennsylvania and the Department of Allergy of the Roosevelt Hospital. Their report is based on the results of the treatment of two patients, which was completed five months and four months respectively before the report was written. The first patient was a woman, aged forty-five years, who had a strongly allergic family history and had been severely asthmatic since childhood. For the previous fifteen years her asthma had been so severe that she required at least one injection of epinephrine every night and on many occasions many injections both day and night. This patient's history is given in considerable detail. She gave strongly positive reactions to no less than 42 allergens, including several inhalants and many foods. Further, after an operation on the maxillary antrum *Staphylococcus albus* and *Streptococcus viridans* were grown from the antral tissue. Apparently, the asthma was both extrinsic and intrinsic. Eventually, after most extensive investigation, and after many different forms of treatment, penicillin was given in doses of 100,000 units every three hours until 1,375,000 units had been given. This was followed by a complete remission of asthmatic symptoms for almost four months, although sibilant râles were almost constantly audible in the lungs. An acute infection of the upper respiratory tract produced the expected recurrence of asthma. After the attack subsided, however, subjective relief followed, though the râles were still present. In the second case, that of a woman twenty-six years of age, intracutaneous tests with all the usual inhalant and food allergens produced no reaction, but the sputum contained pneumococci and both antra were infected. The history extended over a period of sixteen years. After penicillin therapy no subjective asthma was present for four months. Leopold and Cooke state that twenty-five additional patients with intractable asthma have been treated with penicillin. While they are unable to know what results, if any, will be achieved in this group, they have learned that penicillin is not a panacea in all cases of asthma due to infection. Leopold and Cooke's investigations show, as might have been expected, that the matter is not simple. As they so rightly remark, there is no reason to believe that penicillin will be of the slightest benefit in extrinsic bronchial asthma. They think that possibly it may be helpful in the treatment of two groups of asthmatics, those with both extrinsic and intrinsic asthma, provided the extrinsic factors are properly controlled, and those who are affected by intrinsic disease only. In the latter circumstances it would be unjustifiable to expect benefit to result unless the infecting organism was one known to be sensitive to penicillin *in vitro*. Much more work is needed before it can be determined, in the words of Leopold and Cooke, "whether or not penicillin will

yield results of sufficient permanency as to warrant its use in the treatment of intrinsic bronchial asthma". In the meantime, if penicillin is used in asthma, it must be used in the knowledge of incomplete justification, and an effort should always be made to exclude extrinsic factors and to determine the organism causing infective symptoms.

### SEPTIC PULMONARY INFARCTION.

IN 1941 G. R. Krause and E. M. Chester in a clinical and radiological study of infarction of the lung reported that among 6,548 cases in which autopsy was performed there were 344 examples of infarction of the lung,<sup>1</sup> an incidence of 5.2%. In 174 instances the pulmonary infarct was a significant cause of death; in 22% of the 174 cases a correct diagnosis of the infarction was made. Among the 174 cases were eleven cases in which lung abscess developed as a secondary condition to aseptic infarction. The eleven cases together with six others in which a correct diagnosis was made *ante mortem* were discussed later by Chester and Krause in another article.<sup>2</sup> These authors tried to exclude from their study all cases of blood-stream infection. Their work may thus be taken as giving some idea of the general prevalence of pulmonary infarction. In their second paper they show that an aseptic infarction may be the site of a subsequent abscess which declares its presence days or weeks after the occurrence of the infarction by the appearance of a foul purulent sputum. This type of septic infarct is different from one which follows pulmonary infarction by a septic embolus. H. H. Hussey and S. Katz have reported the occurrence of eight cases of infarction of this latter type.<sup>3</sup> These authors point out that in any case of septicæmia caused by a pyogenic organism abscesses may occur in the lungs as well as elsewhere. This is not the type in which they are interested; they have confined their attention to cases in which a septic thrombus in the peripheral veins becomes dislodged, enters the pulmonary circulation and causes infarction. They show the comparative rarity of the lesion by reference to a report by Hedblom, who found among 528 cases of pulmonary abscess only 3.9% which were certainly or probably of embolic origin. Hussey and Katz's first three cases are examples of septicæmia and pulmonary infarction accompanying pharyngeal infection. The clinical histories are of great interest, and one of the most important features is the fact that though the systemic effects of local disease were obvious in all cases, the appearance of the pulmonary lesions was the first clear indication of the need to search for a focus of thrombophlebitis. Hussey and Katz remark that only when the parapharyngeal space is the site of a phlegmonous inflammation may local signs become prominent. The second three cases in the series were cases of acute bacterial endocarditis, identical in almost every respect. All three subjects were Negroes addicted to the intravenous use of heroin; in each case bacterial endocarditis involved the tricuspid valve. In no case was preexisting heart disease found at autopsy. The correct diagnosis was made during life in each case. The last two cases followed pelvic thrombophlebitis. In both cases pelvic infection followed abortion. In each instance the "hectic clinical course" began some days before the development of pulmonary infarction. Hussey and Katz mention other sources from which emboli can originate—lateral sinus thrombosis and septic thrombophlebitis of the peripheral veins.

Several important clinical points call for mention. The first is that the appearance of a pulmonary lesion may be the first clear indication of the existence of a septic focus. The second is that the X-ray appearances may be variable. Krause and Chester showed this in their studies. Bronchopneumonia may be simulated or rounded or wedge-shaped peripheral opacities may be seen. The third has to do with the possible ligation of veins to isolate the source of emboli. This heroic measure will not often be possible.

<sup>1</sup> Archives of Internal Medicine, Volume LXVII, 1941, page 1144.

<sup>2</sup> Radiology, Volume XXXIX, 1942, page 647.

<sup>3</sup> Annals of Internal Medicine, April, 1945.

<sup>1</sup> The American Journal of the Medical Sciences, June, 1945.

## Abstracts from Medical Literature.

### PHYSIOLOGY.

#### Seasonal Changes in the Food Consumption and Rate of Growth of the Albino Rat.

H. L. CAMPBELL (*The American Journal of Physiology*, March, 1945) states that a careful survey of food intake of a large number of rats maintained upon the same diet over a period of years shows the amount of food consumed to vary with the season of the year, the largest intake being in the winter months, the smallest in the summer months. The difference is unmistakably an actual difference, it being many times its probable error. This is established for the adult rat, six months of age and over, by data including over 900 cases for each three-month season, and for the rapidly growing rat, twenty-eighth to fifty-sixth day of age, by 82 to 173 cases. It is also shown that the rate of growth of the young rat varies in the same way, the greatest gain being made in the winter months, the least in the summer. This is established for both males and females by groups of 159 to 517 cases each. The food is used most efficiently in the summer, as shown by gain made per 1,000 Calories, least efficiently in the fall. These findings bring out more forcibly the importance of one rule that has always been followed in the planning of long-time experiments in the Columbia laboratories, namely, that animals must be chosen to represent all seasons of the year or so that such differences as those just reported will be eliminated.

#### The Influence of Aging in Man upon his Capacity for Physical Work.

P. M. DAWSON AND F. A. HELLEBRANDT (*The American Journal of Physiology*, March, 1945) record some observations on the capacity for physical work and the cardio-vascular reactions during exercise made upon a single subject. The subject rode a cycle-ergometer at 41, 53, 57, 63 and 71 years of age. During these rides the arterial blood pressures and pulse rate were usually determined and the external work done was calculated for each ride. The results obtained support the following conclusions. With age working capacity fell off, becoming at seventy-one years about 50% of what it had been at forty-one years. When two rides are performed on the same day the score in the afternoon is greater than the score in the morning by about 3-5% at both fifty-seven and sixty-eight years. The number of days necessary for complete recovery from a ride is greater at sixty-eight and seventy-one than at fifty-seven years. The circulatory reaction during maximal performance is much the same at all these ages. At forty-one years the systolic pressure rose higher, but the ride which produced this pressure was only two-thirds as long as the rides performed later and the tempo was much higher. The resting values of the systolic pressure, whether the subject was lying or sitting on the cycle-ergometer, did not change between the ages of forty-one and sixty-eight years. The maximum

reduction of the resting pulse rate due to training is about the same at forty-one and at seventy-one years. In training for a test on the cycle-ergometer the best preparation is to ride frequently upon this apparatus or to perform three-mile runs. Road walking and mountain climbing do not yield such good results.

#### Self-Selection Studies on Coprophagy as a Source of Vitamin B Complex.

C. P. RICHTER AND K. K. RICE (*The American Journal of Physiology*, March, 1945) have shown that rats kept on a self-selection diet completely lacking all components of the vitamin B complex ate 3.0 to 5.0 grammes per day of faeces collected from normal adult rats. The daily output of faeces from two to four normal adult rats supplied all of the needed vitamin B components for one rat on a diet otherwise deficient in vitamin B. Faeces-fed animals continued to grow at normal rates and showed no signs of specific deficiency. Their appetites for carbohydrate, fat and protein were essentially the same as they had been when given access to yeast or liver powder. When no longer given access to faeces the rats at once lost weight at a rapid rate. They showed the changes in appetite which are characteristic of vitamin B deficiency, namely, a substitution of fat for most of the carbohydrate and protein previously taken. Thus it is concluded that for at least forty to fifty days faeces satisfactorily replaced all the components of the vitamin B complex found in yeast or liver powder. That the rats ate the faeces at once and in large amounts and over long periods of time without any ill effects would indicate that the faeces did not contain any bitter tasting or toxic substances.

#### Pressure Breathing.

A. P. GAGGE, S. C. ALLEN AND J. P. MARBARGER (*The Journal of Aviation Medicine*, February, 1945) describe pressure breathing as it is now used in the army air force in America. Positive pressure respiration has had some use as a therapeutic measure in the treatment of bronchitis, pneumonia, asthma and other forms of lung infection. Increasing altitude performance in planes has necessitated the development of a new type of oxygen system to provide protection for air crews flying higher than 35,000 feet. Experience has shown that the practical ceiling for the breathing of pure oxygen is approximately 42,000 feet for brief periods. Experiments showed that an increase in oxygen pressure in the lungs of 15 to 25 millimetres of mercury or eight to twelve inches of water would increase the operational ceiling by several thousand feet and allow ascents to 50,000 feet for a few minutes. Pressure breathing is the name given to this condition when gas is supplied to a subject at pressures above ambient pressure. In normal inspiration inhalation is an active phase and requires a definite effort whilst exhalation is passive. With pressure breathing, active and passive phases are reversed, inhalation requires no effort, whilst a definite effort must be made to exhale. Contrary to prevalent belief it is possible to breathe continuously against moderately high exhalation pressures. A pressure of four inches of water is used clinically and is easily tolerable; a pressure of eight inches is marginal,

whilst one of twelve inches requires a considerable muscular effort. The effort in exhalation is, however, greatly reduced at high altitude. One factor which may limit the use of the higher levels of pressure breathing is its effect on circulation, that is, in impeding venous return. The pressures used by the authors (eight inches of water) usually cause a rise in venous pressure and are tolerated by practically all normal individuals. The most important immediate application of pressure breathing is as a safety measure between 35,000 and 40,000 feet, but it should have some permanent use in those instances in which pressurized aircraft lose their pressure by accident or enemy action.

#### Effects of Temperature Change on the Water Balance in Man.

C. L. CONLEY AND JOHN L. NICKERSON (*The American Journal of Physiology*, March, 1945) have studied the effect of changes in the external temperature on the fluid and electrolyte balance of six normal male subjects under carefully controlled dietary and environmental conditions. The extrarenal water loss was quite constant during a period of uniform temperature. Upon change of the environmental temperature, the extrarenal water loss and the skin temperature quickly attained new levels. There was no evidence of slow acclimatization. The renal excretion of sodium and chloride appeared to reflect the difference between the intake of these substances and the quantities lost in the sweat. A pronounced and prolonged increase in plasma volume was found on exposure to heat. On exposure to cold the plasma volume was reduced, but tended to return toward normal within a few days.

#### The Upper Limits of Environmental Heat and Humidity Tolerated by Acclimatized Men Working in Hot Environments.

L. W. EICHNA, W. F. ASHE, B. BRAN AND W. B. SHELLEY (*The Journal of Industrial Hygiene and Toxicology*, March, 1945) describe the results of the tests made with volunteers to determine the upper limits of heat and humidity which could be tolerated by men marching nude at three miles per hour and carrying a twenty-pound pack. The environments studied showed dry bulb temperatures from 93° to 121° F. and wet bulb temperatures between 90° and 96° F. Within the range of environments studied, the wet bulb temperature is the limiting factor which determines the ability of men to work in hot environments. The dry bulb temperature exerts only a minor influence in this regard. As the upper environmental limits are approached, a narrow range of wet bulb temperature, 4° to 5° F., separates environments in which work is relatively easy from those in which work is impossible. When the wet bulb temperature is below 91° F., men work easily, efficiently, and with only mild physiological changes. At wet bulb temperatures between 91° and 94° F., men are capable of prolonged, moderately hard work, but they then work inefficiently and with difficulty, lose vigour and alertness, sustain undesirable physiological changes and may become mild heat casualties. Moderately hard work at wet bulb

temperatures of 94° F. and higher leads rapidly to total disability in most men, with excessive and often disturbing physiological changes. The limiting wet bulb temperatures for each of the above types of performance are slightly (approximately 2° F.) higher at dry bulb temperatures below 100° F. than at a dry bulb temperature of 120° F. At the upper environmental limits, sweating is extremely profuse; most men average 2.25 litres per hour and some reach 3.5 litres per hour. Acclimatized men working above the upper environmental limits develop marked physiological changes and undesirable, frequently disabling, symptoms similar to those sustained by unacclimatized men when first working in the heat.

## BIOCHEMISTRY.

### Fatty Acids.

G. MEDES *et alii* (*The Journal of Biological Chemistry*, January, 1945) have investigated the breakdown of carboxyl-labelled butyric acid by liver tissue. The study indicates that this substance is converted into ketone bodies mainly by fission into  $\alpha$ -carbon chains with subsequent recombination, and to a lesser extent by direct  $\beta$  oxidation. The butyric acid isolated at the close of the experiment was not diluted by butyric acid from other sources. All of the excess  $C^{13}$  of the respiratory carbon dioxide can be accounted for as the result of the breakdown of ketone bodies, and does not necessarily represent a difficult oxidation pathway in the breakdown of butyric acid.

### Ferrihaemoglobinemia.

W. N. M. RAMSAY (*The Biochemical Journal*, Volume XXXVIII, 1944, Number 5) has described a modification of the Conant-Scott-Douglass technique for the determination of total haemoglobin (ferrohaemoglobin plus ferrihaemoglobin, but excluding carbon monoxide haemoglobin). In 21 out of 23 specimens of normal human blood the total haemoglobin content has been found to exceed the ferrohaemoglobin by more than 1.5% or more. In 14 out of 17 specimens of normal horse blood the total haemoglobin has been found to exceed the ferrohaemoglobin by more than 1.5%. In most cases the differences are far greater than those found in human blood. Circumstantial evidence is presented which tends to confirm the hypothesis that the differences are due to the presence of ferrihaemoglobin.

### Penicillin.

R. J. AND M. D. HENRY (*The Journal of General Physiology*, May, 1945) have investigated some effects of penicillin. Penicillin in the range of concentration from 250 units per millilitre to approximately 2,650 units per millilitre inhibits the rate of cell division of the fertilized sea urchin egg from 0% to 100%. Penicillin in the same range of concentrations has no effect on the oxygen consumption of the unfertilized or the fertilized eggs. Penicillin is bound by some component of the sea urchin egg in amounts sufficiently large to lower the initial concentration, this binding apparently not being related to the inhibitory action. Penicillin inhibits the adsorption of

methylene blue onto activated charcoal in concentrations as low as 100 units per millilitre. Penicillin in the low inhibitory concentration of 100 units per millilitre antagonizes to a small extent the strong inhibition of methylene blue adsorption by 0.1%, 0.2% and 1.0% pepsine.

### Anaemia.

M. L. SCOTT *et alii* (*The Journal of Biological Chemistry*, March, 1945) have studied the organic factors required for prevention of anaemia in chicks. Evidence has been presented which demonstrates that the *Lactobacillus casei* factor and either the lactone of 2-methyl-3-hydroxy-4-hydroxymethyl-5-carboxypyridine or the lactone of 2-methyl-3-hydroxy-4-carboxy-5-hydroxymethyl-pyridine is required for the complete prevention of the macrocytic, hypochromic anaemia that develops in chicks fed a purified diet. The 5-carboxy lactone has been designated  $\alpha$ -pyracin and the isomeric 4-carboxy lactone  $\beta$ -pyracin.  $\beta$ -pyracin was found to be considerably more active in promoting growth than  $\alpha$ -pyracin, but was only slightly more effective in preventing anaemia. Smaller quantities of  $\beta$ -pyracin and *Lactobacillus casei* factor were required to prevent anaemia than were required to promote growth. The results of haematological studies showed that when the *Lactobacillus casei* factor alone was added to the diet, the kind of anaemia which developed was a normocytic hypochromic type. When  $\beta$ -pyracin was added alone, the kind of anaemia that occurred was a macrocytic normochromic type.

### Folic Acid.

W. A. KREHL AND C. ELVEHJEM (*The Journal of Biological Chemistry*, March, 1945) have investigated the importance of folic acid in rations with a low nicotinic acid content. Young dogs placed on a synthetic ration with a low nicotinic acid content and allowed to proceed to a severe nicotinic acid deficiency responded poorly to standard doses of nicotinic acid and soon failed again, death generally ensuing despite administration of nicotinic acid. When the basal ration was supplemented with a folic acid concentrate derived from solubilized liver extract and the same experimental conditions were followed, dogs responded adequately and consistently to nicotinic acid and could be used in repetitive assays.

### The d-amino Acids.

A. ALBANESE (*The Journal of Biological Chemistry*, March, 1945) has studied the utilization of d-cystine by man. A comparison of the excretion data on the sulphur metabolites, indican, methionine and inorganic sulphur following the administration of equal amounts of l-cystine and d-cystine suggests that some utilization of d-cystine occurs in the human.

### Choline.

H. D. FRIEDLANDER *et alii* (*The Journal of Biological Chemistry*, March, 1945) have investigated the effect of ingested choline on the turnover of plasma phospholipides. They used dogs fed on a diet with a high fat and a low protein content. Radio-active phosphorus was used as the labelling agent. A single feeding of 300 milligrammes of choline chloride per kilogram of body weight

accelerated phospholipid turnover in plasma. Choline increased the rate of change in the specific activity of phospholipid phosphorus of plasma during the early intervals after the administration of radio-active phosphorus. The maximum values found for the specific activity of plasma phospholipid phosphorus were higher in dogs fed with choline than in dogs not fed with choline.

### Phosphorus.

W. J. VAN WAGTENDONK AND H. LAMFROM (*The Journal of Biological Chemistry*, April, 1945) have studied the changes in the distribution of acid soluble phosphorus in the muscle during a deficiency of the antistiffness factor. A deranged distribution was found. The inorganic phosphate concentration increases during the deficiency, while the concentrations of creatine phosphate and adenosine triphosphate decrease after some fluctuations at the onset of the deficiency. The antistiffness factor and vitamin E have different functions in the animal organism.

### Antibody Production.

H. S. MALONE *et alii* (*The Journal of Biological Chemistry*, April, 1945) have made preliminary studies of antibody production. They considered that as the liver is regarded as one of the sites of globulin formation, stimulation of this organ during active immunization should effect an increase in antibody production. A soluble liver extract fortified with the vitamins of the B complex was administered parenterally to test animals while they were being immunized to *Salmonella schottmüller*. Administration of the fortified liver extract during immunization appeared to increase the production of antibodies.

### Spermatogenic Activity of Steroids.

G. MASSON (*The American Journal of the Medical Sciences*, March, 1945) has studied the spermatogenic activity of sixteen steroids. He points out that the results of previous investigations by various workers are not all of value for purposes of comparison, because the workers used either impure urinary extracts or insufficiently described compounds. For his experiments he used hypophysectomized immature male albino rats. The results are arranged in terms of testicular weight and the presence of spermatozoa in the seminiferous tubules. Control groups of comparable animals were also observed. The following substances were tested:  $\Delta^1$ -androstene-3 $\beta$ , 17(a)-diol dipropionate; 17-methyl- $\Delta^1$ -androstene-3 $\beta$ , 17(a)-diol; 17-methyl-testosterone; 17-methyl-androstane-3 $\beta$ , 17(a)-diol;  $\Delta^2$ -androstene-3 $\beta$ , 17(a)-diol testosterone;  $\Delta^2$ -pregnenolone; progesterone;  $\Delta^2$ -androstenedione; dehydroisoandrosterone; ethynyl testosterone; desoxycorticosterone acetate; acetoxy-pregnenolone; cholesterol. Among these the most active compounds were found to be androstenediol dipropionate, methyl androstenediol,  $\Delta^2$ -pregnenolone, methyl androstenediol, androstenediol and dehydroisoandrosterone. The author states that it has been established that the ability of steroids to protect the testis against the atrophy caused by hypophysectomy is entirely independent of the other main pharmacological activities.



## British Medical Association News.

### SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held on June 28, 1945, at the Robert H. Todd Assembly Hall, British Medical Association House, 135, Macquarie Street, Sydney, Dr. E. A. Tivey, the President, in the chair.

#### Hypertension and Pregnancy.

DR. R. JEREMY read a paper entitled "Hypertensive States in Pregnancy" (see page 270).

DR. R. F. BACK read a paper entitled "Hypertension and Allied Conditions in Pregnancy" (see page 272).

PROFESSOR B. T. MAYES said that the meeting was a happy occasion. It was the practical manifestation in the art of medicine of that secret to success—coordination of services—whose victorious combination had recently been witnessed in another art—the art of war.

Professor Mayes had listened to many an informal debate among his colleagues on what constituted the ideal obstetrician. He would affirm that the ideal obstetrician must be firstly a physician; another that he be primarily a surgeon. Probably he should be all three and one more—a biochemist. As with the ideal in anything, this was not practicable, and so the position was now that the obstetrician no longer regarded himself as the physician, and Professor Mayes was credibly told that the physician might not always regard himself as an accomplished obstetrician. The ideal would therefore seem to lie in a new direction—coordination. That, to him, was the full significance of that night's combined meeting.

There was no common complication of pregnancy in which the result to mother and baby could be so greatly improved by consultation as in toxæmia. His privilege was merely to open the discussion on a subject of wide interest, and in which obstetricians wanted help. Dr. Back and Dr. Jeremy had given facts and suggested lines for the recasting of some of the current views. This was progress.

Professor Mayes wished to open the discussion by telling the story of the problem as it came to the obstetrician. In Australia that meant the general practitioner, as well as the specialist. Most of the obstetrics was done, and done well, by the general practitioner. Professor Mayes would append the pertinent questions, and profiting by what Dr. Back and Dr. Jeremy had told them, he would try to answer the questions. He would also like, through the President, to invite the answers also from the meeting.

Mrs. S., aged nineteen years, was pregnant for the first time. She was due for confinement on July 17. (She was then 37 weeks pregnant, with three weeks to go.) Since she was three months pregnant her weight had increased up to the eighth month by monthly rises of 3, 13, 9, 13 and 14 pounds. Her blood pressure was 146 millimetres of mercury systolic and 86 diastolic at three months. It was now 150 and 100 millimetres. Oedema became marked at seven and a half months. Only a cloud of albumin had appeared, and that in only the last two weeks. The daily output of urine was forty ounces. The blood urea content was sixteen milligrammes per centum and the figures given by the urea concentration test were 0.55, 0.65, 0.85, the volume of urine excreted being respectively 115, 55, 60 millilitres. The total urea excretion in these hourly specimens was 2.4 grammes. In the last month of pregnancy it should be 5.3 grammes. That was the medical side of the problem. On the obstetric side, the presentation was a breech with extended legs, and the baby would seem to be large. In regard to this patient Professor Mayes wished to ask the following questions.

**Question 1.**—What was the diagnosis? Was it a pure pre-eclamptic toxæmia? It had to be remembered that the patient had a blood pressure of 146 millimetres of mercury systolic and 86 diastolic at the outset of pregnancy. She had a poor urea excretion. Was she suffering from chronic hypertensive cardio-vascular disease which rendered her more liable to a pre-eclamptic toxæmia? Professor Mayes thought that the latter was the true state of affairs.

**Question 2.**—How should the patient be fed? Was it by a protein starvation at 37 weeks, when mother and baby required a daily intake of eighty grammes of protein? Professor Mayes would sooner that she stayed in bed on a pound of steak a day! The answer was that they would give her a normal protein diet.

**Question 3.**—What was the risk of eclampsia? The answer was that the risk was unpredictable, but always to be feared.

**Question 4.**—What was the risk of aggravation of the patient's hypertension by this experience? The answer was that from the remarks of the two earlier speakers this risk would appear to be less than was previously feared.

**Question 5.**—What was the risk in future pregnancies? The answer was that the risk was not undue if her present condition was pre-eclamptic toxæmia. Recurrence was more likely if her original condition was a chronic hypertensive cardio-vascular one.

**Question 6.**—What was the risk to the baby—a malpresentation in a toxæmic mother? The answer was that from the point of view of the toxæmia, according to Dr. Back's remarks, it was poor unless the child was delivered soon. From the point of view of the malpresentation Professor Mayes was uncertain but optimistic.

**Question 7.**—What should be done with her? Version had failed. The verdict would be, "terminate her pregnancy." Professor Mayes agreed and asked how? By medical induction or by surgical induction? One or two might ask about Cæsarean section.<sup>1</sup>

DR. H. A. RIDLER thanked the speakers for their papers; he said that the preparation of papers meant a lot of work, and those who prepared them got very little thanks for their trouble. Dr. Ridler said that after hearing what had been said, he was still more at sea about the conditions under discussion than when he came to the meeting. Many of those present might resent some of his remarks. He had seen literally thousands of patients suffering from toxæmias of pregnancy. Discussing induction of labour, Dr. Ridler said that it was remarkable what could be done. Some years earlier he had been called to a country town in the middle of winter to examine a woman who was supposed to be suffering from chronic nephritis; she was six months pregnant. He arrived late at night, examined the patient and inserted the bougies; labour began at five o'clock the next morning, and the nurses attending her were able by their devotion to keep the baby alive when it was born. Yet Professor Mayes was worried about the baby of his patient who was thirty-seven weeks pregnant. Dr. Ridler then referred to the diagnosis of the toxæmias of pregnancy. He said that Sir Comyns Berkeley, when he was in Australia, had discussed a patient of his in London, three of whose pregnancies he had terminated on the grounds that she was suffering from chronic nephritis; on the fourth occasion when she became pregnant she firmly refused to allow him to terminate the pregnancy, and it concluded without untoward incident. Dr. Ridler went on to say that in his student days he had been taught that one attack of eclampsia conferred a lasting immunity from the disease; he still thought that that was true in certain cases. Dr. Ridler went on to discuss the testing of urine for albumin. He said that after long experience he believed that most people who tested the urine did not know how to test it properly. This probably held true of 75% of those present that night. If the patient had bacilluria, how was the test for albumin to be made? There was a method of clearing the urine, but it did not appear to be generally known. What was to be done with toxæmic patients when the diagnosis of toxæmia had been made? They should be put to bed. But where were beds to be obtained for them? Dr. Ridler said that a few years earlier he had had a patient suffering from toxæmia, and he had put her to bed in a private hospital and kept her there. The nurses told her that there was no need for her to be kept in bed; and advised her to get another doctor. She did so; but the new doctor was deaf, and hearing only half of the nurses' arguments, kept her in bed.

PROFESSOR C. G. LAMBIE said that those present were indebted to the speakers and to Professor Mayes for bringing up a subject of great importance and pathological interest. So many issues were involved that it was difficult to find those which were important. The subject was complicated and confusing. In the first place, cases based on chronic nephritis could be set aside as of minor importance. The real issue was the relationship between eclampsia and hypertension. With regard to the first group in the American classification quoted by Dr. Jeremy (hypertension not associated with pregnancy), which of the varieties men-

<sup>1</sup> Professor Mayes has reported that on the day following the meeting he attempted a medical induction. Fortunately the patient came into labour. The breech came down close to the perineum, where it "stuck". The pelvic floor was injected with a 1% solution of "Novocain". With nitrous oxide and oxygen anaesthesia during each pain she pushed the breech a little further. It "stuck" again. Episiotomy was performed. The patient pushed the breech a little further. Here it "stuck" again. At this stage the baby was extracted. Mother and baby are well.

tioned bore any relationship to or analogy with the hypertension present in pregnancy? The symptoms of eclampsia resembled two of the many kinds of change met with in the first group. The symptomatology resembled that of malignant hypertension—fits occurred, albumin and blood were found in the urine, cotton-wool patches *et cetera* were observed in the retina, and complications such as pulmonary oedema might appear. On the other hand, there were cases of chronic hypertension in which the terminal phase resembled malignant hypertension—much albumin and blood were found in the urine, and cerebral complications and convulsions occurred as in malignant hypertension. In eclampsia the symptoms were related rather to chronic hypertension than to acute hypertension, which ran a short course in young people. Another point of resemblance was that in malignant hypertension a macular star was in evidence, though Professor Lambie understood that in eclampsia a macular star was rare if it ever occurred. There seemed to be some resemblance between an acute exacerbation of chronic hypertension and eclampsia. In the eclamptic condition, the position could possibly be stated in the following way: did pregnancy do something to patients with hypertension or predisposed to it so as to induce what corresponded to the malignant phase? Or on the other hand, did the presence of hypertension merely embarrass the patient, making it difficult for her to combat some other pathological process? Professor Lambie went on to say that there seemed to be some confusion in the use of the word "toxæmia". The word slipped in every now and then; but was there really any toxæmia present? In malignant hypertension the symptoms would be attributed to mechanical causes. Cerebral complications were usually attributed to vascular spasm, vascular degeneration, increased permeability of capillaries, oedema *et cetera*, in the brain. The same thing applied to the increase in the amount of albumin and the presence of blood in the urine. It could not be assumed that these were symptoms of toxæmia; they might result from vascular spasm in the kidney. Were any symptoms present that could not be accounted for by mechanical factors? There was one point that looked as if some other factor might be at work; that was the fact that in the case referred to by Professor Mayes, although the patient had only a trace of albumin in the urine, she had much oedema. What was the cause of oedema? Was it connected with protein deficiency in pregnancy? Professor Lambie agreed with Professor Mayes that these patients should be given an adequate supply of protein. Reverting to the question of what was the criterion of danger, Professor Lambie said that the amount of albuminuria and the changes in blood pressure should be watched for. It was not the absolute level of the blood pressure that should be noted, but the trend of the blood pressure—whether it tended to rise. Referring to the testing of the urine for the presence of albumin, Professor Lambie said that he was sorry that Dr. Ridler had such a low opinion of his own day and generation, and Professor Lambie hoped that it was now possible to say: "*Nous avons changé tout cela.*" When a physician was called to see a patient in hospital, he was often asked whether the pregnancy ought to be terminated. If the patient had well-compensated mitral stenosis or some similar condition, he thought it safe to allow the pregnancy to proceed. But if she was hypertensive, there was the fear that eclampsia might supervene, and it was difficult to come to a decision. Dr. Back had said that more of a search should be made for other signs in the vascular system than for hypertension. But what should they look for? What signs were important? Professor Lambie said that he had no very clear idea on that subject, and wanted further enlightenment.

Dr. A. J. GIBSON said that he had listened with great interest to the papers and discussion. He had thought about the subject for many years and had finally considered that his ideas were clear-cut; then he read another paper, and his whole opinion had to be reformed. He had had to think again about his own experiences. Dr. Gibson said that it was necessary to make as thorough a study as possible of each individual patient. First of all came the family history. As Dr. Jeremy and Dr. Back had pointed out, that was not always easy to obtain properly. But it was often possible to get a reasonably good idea whether the patient came from hypertensive stock or not. Often it was impossible, but the attempt was worth while. An important point was the illnesses from which the patient had suffered in her youth. Women who in childhood had suffered from scarlet fever, diphtheria and infected throats were often candidates for toxæmia of pregnancy. It was also important to take a careful menstrual history. Dr. Gibson quoted the

work of Meave Kenny, in London, who had recently investigated by X rays 1,000 cases of suspected abnormality of the bony pelvis. It was found that if the patient had started menstruation after the age of 14.5 years the likelihood of an abnormality was increased and the incidence of toxæmia of pregnancy in such patients was ten to twelve times that among patients with normal types of pelvis. Dr. Gibson said that these were points that should be sought for, so that trouble could be foreseen and prepared for early. He had for many years believed that if a patient had a blood pressure over 130 millimetres of mercury (systolic) and 80 millimetres (diastolic) in the early months, she was a candidate for trouble. He had found that belief to be true in practice. Many babies were lost through miscarriage, toxæmia or accidental hæmorrhage. There was always a risk for any patient with blood pressure over the quoted figures. Allowance had, of course, to be made for emotional factors when the blood pressure was being estimated. If all the points he had mentioned were investigated carefully, it could be foreseen that a large number of patients would be toxæmic. There were quite a number who had endocrine disorders—thyroid and pituitary deficiency *et cetera*. It was only by looking for each one of the factors mentioned and studying the patient's progress that they could learn. Dr. Ridler had spoken about the immunity conferred by an attack of eclampsia. That was all very well, if the patient recovered; many patients did not. But there was a large rate of recurrence of eclampsia and of toxæmia. It was difficult to estimate what a patient would do. Dr. Gibson quoted the history of one patient whom he had seen. In her first pregnancy her systolic blood pressure was 200 millimetres of mercury and her diastolic pressure 100, and albuminuria was present; labour was induced, a live baby was born, and all went well; yet her urea concentration was under 2%. In her next pregnancy she failed to attend the hospital until she was near term; the story was the same, and a live baby was born. The third and fourth pregnancies progressed in the same way, and each time a live baby was born. At the thirtieth week of her fifth pregnancy her blood pressure was high, but lower than in previous pregnancies; her kidney condition had improved, and her urea concentration was up to 6%. Dr. Gibson said that this patient should have had dead babies, eclampsia, all kinds of disasters; but her family history was perfect, there being no record of cardio-vascular disorders, and her close relatives were all "long livers"; she herself had had no illnesses, and her menstrual history was normal. That was the reason why the last phase of the preeclamptic trouble did no permanent damage. If she had had any abnormality in any of the three factors mentioned, then she would not have had live babies or done so well. In any attempt at solution of the problem, more individual study was necessary. Dr. Back had been working along the right lines, and Dr. Gibson hoped that he would continue to work and make available his figures covering a long period. Dr. Gibson said that follow-up investigations in this type of case were the only way to discover facts that would be of help in the treatment of the conditions under discussion.

Dr. H. LEAVER said that he had appreciated the papers. He suggested that the problem should be approached from a different angle. Perhaps Professor Mayes could correct him when he said that eclampsia was a disease restricted to the human female; it was unknown in any other mammal. If eclampsia was confined to the human female and was unknown amongst other mammals, what was the difference between the human female and other mammals? It was known that the endocrines of other mammals were interchangeable; they were used therapeutically. It was assumed that the physiology of pregnancy was the same in other mammals as in the human female. Yet she was subject to these serious diseases, and other mammals were not. There was a primary difference between the human female and other mammals; in the human female the normal abdominal pressure of the uterus was entirely reversed—it was into the pelvis, whereas in every other mammal it was in the opposite direction towards the diaphragm. In other mammals the pressure was away from the ureters, whilst in the human female it was directed onto the ureters. It was possible that this was the essential factor. Modern work seemed to indicate that the cause of eclampsia was ischaemia of the kidneys. Dill and Erichson had induced eclampsia in pregnant bitches by constricting the renal arteries. The animals showed all the signs and symptoms of eclampsia, including liver damage, cerebral oedema, convulsions and so on. It was known that in pregnancy there was pressure on the ureters. Dr. Leaver thought that there was every indication that all the characteristics of eclampsia could be explained from that point of view. It was commonest amongst

*primiparae*; the abdominal musculature was toughest in *primiparae*. It was also common in twin pregnancy; when twins were present the pressure was greater. Eclampsia was a cumulative disease, most likely to occur in the last month, fortnight or week of pregnancy. The only cumulative factor in pregnancy was the uterine pressure on the ureters. It was reasonable that, as both ureters were compressed, the urine should fail to get through as it should. Consequently there was back pressure on the tubules of the kidney. They became distended, with the result that the capillaries along the tubules were compressed, and the kidney became ischaemic. It was known that the kidney produced a pressor hormone, and that the ischaemic kidney produced a hormone which could bring about in the animal all the signs of toxæmia. Dr. Leaver said that it seemed to him that the problem should be approached from the comparative point of view; pregnancy in humans should be compared with pregnancy in other mammals. Treatment in eclampsia was by rest. What happened when the patient was put to bed and lay prone? The pressure was taken off the ureters, the blood supply was given back to the kidneys, and they again functioned normally. Eclampsia was a disease of healthy young women. In hypertensive disease *et cetera* the kidneys were already producing a toxin (pressor substance). The fact that the latter type of patients were more prone to eclampsia did not show what eclampsia was. Pregnant women suffering from preexisting essential hypertension and chronic nephritis could be successfully carried through pregnancy without developing toxæmias of pregnancy and without aggravation of their preexisting disease. Dr. Leaver thought that the cooperation of a veterinary scientist should be enlisted to look into the question.

Dr. T. DIXON HUGHES said that the papers and discussion had been very interesting. He thought that all these patients had to be taken individually. It was wrong to tell all patients with raised blood pressure and a history of previous trouble that they must not have babies; full investigation was needed first. Diet was important. Dr. Dixon Hughes was a great supporter of the giving of sufficient protein to these patients. He advised any of those present who had not tried the method to do so; their patients would not die, and the babies would do better. But before this diet was instituted, the blood urea level and, if possible, the plasma protein content should be estimated; that would show whether an accumulation of protein substance was already present, and the patient could be fed accordingly. The enthusiast might perform a urea concentration test before a blood urea test, with tragic consequences. One point in Professor Mayes's problem was the question whether the patient had a large or small pelvis. That knowledge might be of some help.

Dr. D. S. FOY also thanked the speakers. He said that he agreed with Dr. Dixon Hughes that care was needed before patients were warned against further pregnancies. It was wrong to do this, because time and time again patients who had been told that they could not have a live baby had successfully gone through pregnancy and confinement with good antenatal care. The discussion had covered every field, but there were one or two points to which Dr. Foy wished to refer. Professor Mayes's case was a good example of the type of worry to which all obstetricians were subjected from time to time. Though the problem was knotty, the knot would be even smaller if Professor Mayes terminated the pregnancy as soon as possible. In such cases Caesarean section, unless performed for some sound reason, would be bad treatment. Referring to Dr. Jeremy's paper, Dr. Foy said that in many of these cases of the first group of renal diseases, the patient could be carried along until the child was viable. Six months had been stated to be the duration of gestation at which the child could be kept alive; Dr. Foy did not think this possible. He never considered terminating pregnancy at less than seven months. Three problems presented themselves when people in the first group of renal diseases were considered: (i) Would the patient's health be jeopardized during pregnancy? (ii) Could the patient have a live baby? (iii) Would the patient's health be affected after pregnancy? The obstetrician had a very responsible task; but the majority of the patients could be brought successfully through their pregnancies. A great risk was the death of the fetus before six months. Moreover, the patient might begin to show signs of toxæmia. But the greatest risks of all were ante-partum hæmorrhage and concealed hæmorrhage. Several patients had in Dr. Foy's experience recently had these complications; there was evidence that the disorder of these patients could be classified in the first group of renal diseases. The mortality rate was very high in ante-partum hæmorrhage. Dr. Foy said that he had been interested in Dr.

Back's paper and in his reports. His own experience had been such that when any of his patients developed eclampsia or near eclampsia, he no longer feared that in subsequent pregnancies they would fall into the same category. The only type of patient of whom he was afraid was the patient who had some evidence of renal damage before her first pregnancy. In order to guard against this danger, Dr. Foy's policy had always been to advocate a complete physical overhaul before marriage, including an examination to see whether any pelvic abnormalities were present. The blood pressure was important also; if the patient's blood pressure was normal, then any threatened renal damage could not be very severe.

Dr. H. A. RIDLER spoke again. He said that he wished to call attention to a most practical point—the induction of labour. The quickest way of emptying the uterus, other than Caesarean section, was by the use of a de Ribes's bag. At the present time there were modern bags, but the bag had fallen into disuse. In a series of articles on the induction of labour, written by Melbourne practitioners and published in THE MEDICAL JOURNAL OF AUSTRALIA late in 1944, no mention had been made of the de Ribes's bag, yet he had learned this method of induction of labour from the staff of the Women's Hospital, Melbourne, where it was in use before 1915.

Dr. TIVEY, from the chair, thanked the speakers for the trouble to which they had gone. He had been a little disappointed that the third leg of the tripod mentioned by Professor Mayes was missing—the biochemist. He would have liked to hear a biochemist join in the discussion.

Dr. BACK, in reply to Professor Mayes, said that his case was, of course, a problem. Dr. Back thought that unless Professor Mayes got the baby delivered quickly, there was a good chance that the child would die. Dr. Back believed that any real improvement in results in the treatment of toxæmia would be due to the discovery of a reliable and efficient method of induction of labour. Dieckmann had views about being able to predict the outcome of any attempt at induction of labour by the condition of the cervix. At the present time one of the obstetricians at the King George V Hospital was going into his figures, to see whether it was possible to tell what the prospect was for termination of pregnancy. Dr. Back said that he had enjoyed Dr. Ridler's remarks. However, Dr. Back thought that Dr. Ridler had misunderstood Professor Mayes; Professor Mayes was not worried about whether the baby would live if he got it delivered, but he was worried about delivering it alive. Dr. Back could not answer Professor Lambie's question directly about when a pregnancy should be allowed to go on and when it should be terminated. It was a question of each patient's cardiac and renal condition. Nobody could answer such a question directly; after weighing all the evidence one could only express an opinion. In conclusion, Dr. Back thanked those present for the reception they had given to his paper, and said that he had learnt a lot in its preparation and hoped that his audience had learnt a little.

#### NOTICE.

THE General Secretary of the Federal Council of the British Medical Association in Australia has announced that the following medical practitioners have been released from full-time duty with His Majesty's Forces and have resumed practice as from the dates mentioned:

Dr. C. D. Jermyn, Kilcoy, Queensland (July 1, 1945).  
Dr. J. A. Hill, Cooroy, Queensland (August 20, 1945).

#### Medical Societies.

##### MELBOURNE PÆDIATRIC SOCIETY.

A MEETING of the Melbourne Pædiatric Society was held on May 9, 1945, at the Children's Hospital, Melbourne. Dr. ERIC PRICE, the President, in the chair. Part of this report was published in the issue of August 25, 1945.

##### Pathological Specimens.

Dr. REGINALD WEBSTER reported the autopsy findings in the case of a male infant, aged nineteen months, who had been presented at the preceding meeting of the society. Dr.



Webster said that it would be recalled that the child suffered from a febrile illness in which anemia, splenomegaly and a petechial eruption in the skin were conspicuous features. The diagnosis was obscure; chronic meningitis, purpura of infective origin and acute leuchemia had been advanced as suggestions, and finally, with the appearance of nodules in the skull, neuroblastoma and even the Hand-Schüller-Christian syndrome. Radiological examination had revealed bony changes in the eighth rib on the right side and several foci of erosion in the bones of the skull. The autopsy elucidated the underlying pathological process as that of chronic suppurative osteomyelitis affecting the eighth rib; pus was evacuated from two small subperiosteal abscesses in the temporal and parietal regions on the right side, and a third suppurating focus was discovered in the orbital plate of the right frontal bone. In the greatly enlarged spleen two areas of infarction were found, one of which had progressed to central suppuration and had evolved as a ragged-walled abscess situated on the anterior border of the spleen. Smears from the contents of the several foci of apparent suppuration were frankly purulent, and clumps of staphylococci were found after very little search.

Dr. Webster said that no doubt it would have been more interesting to meet with the rare condition of xanthomatosis known as the Hand-Schüller-Christian syndrome, in which occurred large areas of rarefaction in the skull—defects which were filled by yellow granulomatous material rich in large "xanthoma" cells containing cholesterol. Similar deposits were prone to occur in the lungs, with resulting diffuse fibrosis, in the posterior lobe of the pituitary gland with consequent *diabetes insipidus*, and in the orbit, inducing exophthalmos. In the case of the child under discussion the microscopic characters of the contents of the foci of cranial erosion were those of suppuration and could not be reconciled with the xanthomatosis of the Hand-Schüller-Christian syndrome.

Dr. Webster then drew attention to a large mediastinal tumour which he had recently removed in the course of a post-mortem examination on a boy, aged seven years. At the time of his admission to hospital the boy exhibited purpura and multiple bruises; routine examination of the blood soon established the diagnosis of acute leuchemia, indicated by the peroxidase reaction as of lymphatic type, and the disease pursued its rapid and inexorable course. At the autopsy the dominating feature was a large tumour in the anterior part of the mediastinum in the situation of the thymus gland, and in configuration consistent with massive thymic enlargement. In this instance the tumour, determined subsequently as a lymphosarcoma, seemed not to display any infiltrative tendency beyond a firm attachment to the pericardium. It was conspicuously apparent that the degree of enlargement affecting the mediastinal lymphatic glands was much greater than that to be observed in other groups of glands, although there was undoubtedly a general hyperplasia of the lymph nodes.

Dr. Webster placed on view a group of five malignant tumours of the thymus, no less than four of which had terminated in acute lymphatic leuchemia. In one instance a clinical diagnosis of mediastinal tumour, based on physical signs, was correctly made at a stage in the child's illness when the leucocyte count was not unduly high and films of the peripheral blood did not suggest leuchemia. The leucocyte count subsequently rose to 400,000 per cubic millimetre, falling to 180,000 under the influence of benzol. This specimen was one of the oldest in the pathological museum, dating back to 1915, when the exhibition of benzol was evidently in vogue in the treatment of acute leuchemia. The children who provided the next three thymic tumours all presented as suffering from acute leuchemia, while the fifth specimen was obtained from a little boy in whom no leuchemic manifestations appeared at any time.

All five mediastinal tumours were lymphosarcomata of thymic origin, and four of the five illustrated the tendency of lymphosarcoma to culminate in acute lymphatic leuchemia. They exhibited infiltrative qualities in varying degree; all established metastases in the lymphatic glands of the mediastinum, and none had occasioned any visceral secondary deposits. In one instance the leuchemic state was first appreciated by the cytological findings in the examination of a specimen of fluid withdrawn from a complicating pleural effusion.

In discussing lymphosarcomata in general, Dr. Webster said that, as they were derived from lymphoid tissue, such tumours might be expected to have a wide distribution. Actually the majority occurred in three situations, namely: the lymphoid tissue of the alimentary canal, especially of the caecum; the anterior part of the mediastinum; and the tonsils and cervical glands. They were large, firm tumours,

and when sections were examined, a whitish, homogeneous appearance was seen, which might be broken by areas of hemorrhage and degeneration. The growths were ultimately infiltrative, and metastases readily formed in neighbouring lymphatic glands, though rarely in other situations. Spread by lymphatic paths was highly characteristic of lymphosarcoma, but was unusual with other types of sarcoma. Dr. Webster recalled that the late E. N. Kettle had maintained with respect to sarcomata in general that invasion of lymphatic glands occurred frequently in the dissemination of these tumours, the lymphatic spread being often obscured by the more obvious vascular sowing. The view of R. A. Willis was that the only types of sarcoma which metastasized to lymph glands were those of lymphoid tissue itself and rhabdomyosarcomata. Sarcomata of lymphoid tissue included the lymphosarcoma and the reticulum sarcoma. Lymph-nodal deposits from other sarcomata were so rare as to be pathological curiosities. In a paper dealing with the mode of dissemination of sarcomata, S. Warren and R. W. Meyer had stated that the proportion of cases in which sarcoma metastasized to lymph glands, though variously estimated, was generally believed to be small. Of 237 cases observed by the authors named, a series from which lymphosarcoma, sarcoma of the endometrial stroma, and melanotic sarcoma were excluded, seventeen (or 7%) were proved to have initiated metastases in lymph glands.

In conclusion, Dr. Webster said that there was no doubt that lymphosarcoma and lymphatic leuchemia were closely allied, and that lymphosarcoma might terminate as lymphatic leuchemia. The clinical condition in which an infiltrating lymphosarcoma was accompanied by a leuchemic blood picture had been termed leucosarcoma, or eponymously, Sternberg's disease. There was evidence that the invasion of the blood vascular system by hordes of primitive lymphoid cells from an existing lymphosarcoma might be precipitated by irradiation therapy applied to the tumour mass. In this connexion Whitby and Britton cited the observations of Kato and Brunschwig, who had recorded two cases of lymphatic leuchemia following deep irradiation of a lymphosarcomatous mass. These authors reviewed the cognate literature from 1920 onwards and found fifteen other examples in which normal blood pictures had been rapidly superseded by the high leucocyte counts and characteristic cytology of acute lymphatic leuchemia, after the institution of X-ray therapy to a lymphosarcomatous tumour. Possibly pointing in the same direction were the observations of Evans and Leucutia, mentioned by Boyd, which noted that of seventeen patients with lymphosarcoma who were treated by deep irradiation over a period of four years, three died of lymphatic leuchemia. However this might be, it could scarcely be allowed to influence adversely what was now routine treatment for this most radio-sensitive of all malignant tumours, which secured a five years' survival for 30% of the subjects of lymphosarcoma and a ten years' survival for 10%, and increased the average expectation of life by two and a half years.

#### Recurrent Pyloric Obstructions.

DR. J. G. WHITAKER first showed a male child, aged two months, who had been admitted to hospital on March 20, 1945, with a history that he had been quite well up to the age of one month. Projectile vomiting then began. He was treated at a suburban hospital and was given a barium meal examination. The fluid was held up at the pylorus after four hours. Six days before his admission to the Children's Hospital, a Rammstedt's operation had been performed through a right upper paramedian incision and post-operatively "Eumydrin" was given without improvement.

On his admission to the hospital, the baby was rather dehydrated and jaundiced; he was immediately given a saline solution intravenously. A basilar meal was given, and on subsequent fluoroscopic examination it was found that a quarter of the meal had passed the pylorus. "Eumydrin", two cubic centimetres in 1/10,000 solution, was given twenty minutes before each feeding. The vomiting persisted, however, and on March 27 another Rammstedt's operation was performed through a right upper transverse incision. A large tumour was delivered and the fibres were split longitudinally. The scar from the previous operation was found to be inadequate. Apart from an infection of the abdominal wound, the child made a satisfactory recovery and was discharged home on April 11, twenty-two days after his admission to the hospital.

Dr. Whitaker then discussed the case of a male child, who had been admitted to hospital on October 23, 1944, at the age of three weeks; he had a history of vomiting of six days' duration. The vomiting was projectile in nature. On

examination, the baby was found to have a hard, mobile pyloric tumour palpable in the abdomen. A basiliac meal was given, and subsequent fluoroscopic examination showed that all the meal was held up in the stomach after four hours. The child was given saline solution intravenously, and two days after his admission to hospital a Rammstedt's operation was performed. Convalescence was only fair. The child's diet was eventually stabilized on a breast feeding, which had to be supplemented with an "A2" cow's milk mixture with added lactose. He was discharged from hospital on November 11. Fourteen days later he was readmitted, with a history of persistent vomiting. The feeding had been changed to condensed milk, without improvement. He had lost one pound in weight and appeared dehydrated. He continued to vomit in spite of the administration of anti-spasmodics and gavage. On December 3 he became very exhausted and dehydrated, and an intravenous transfusion of saline solution was commenced. On the following day he began to vomit brownish fluid. Gastric aspiration produced large quantities of brownish fluid. On December 6 the barium meal examination was again repeated, and again the food was found held up at the pylorus after four hours. "Eumydrin" (0.03 gramme) was given before each feeding, and on December 7, although the vomiting had ceased, the child was listless and was given a serum transfusion. On December 8 the child died.

At the post-mortem examination a relatively large tumour of the pylorus was found—a typical example of congenital hypertrophic pyloric stenosis. The line of the completely healed Rammstedt incision could be discerned, but no recession of the hypertrophied musculature seemed to have been effected. The stomach was much dilated and full of retained contents. There was also an excessive amount of fluid in the tissues. This had occasioned pulmonary oedema, hydrothorax and ascites and collections of free fluid in the retroperitoneal cellular tissue and between the layers of the enteric mesentery.

#### Penicillin Therapy.

DR. ELIZABETH TURNER showed three patients whom she had previously shown at meetings of the society. All three patients had been desperately ill, one with staphylococcal meningitis, another with pneumococcal meningitis, and the third with meningococcal septicæmia. All the patients were physically and mentally well nine months or more after their discharge from hospital. Dr. Turner said that the patients were shown because improvement had been maintained after penicillin therapy had been instituted during the acute illnesses, and cure was apparently permanent.

### Post-Graduate Work.

#### CLINICO-PATHOLOGICAL DEMONSTRATIONS IN NEUROLOGY IN MELBOURNE.

THE Melbourne Permanent Post-Graduate Committee has arranged for Dr. E. Graeme Robertson to give a series of clinico-pathological demonstrations in neurology in the Lecture Theatre, Royal Melbourne Hospital, on Fridays, at 12 o'clock noon as follows:

- September 21: Epilepsy. Epilepsy as a symptom of localizing value. Cerebral neoplasms: habits of growth.
- September 28: Tumours of the frontal and parietal lobes.
- October 12: The visual pathways. Tumours of the occipital lobe.
- October 19: Aphasia. Tumours of the temporal lobe.
- October 26: Tumours in the region of the *sella turcica*.
- November 2: Intracranial aneurysms.
- November 9: Intracranial infections.
- November 16: Spinal tumours.
- November 23: Cinematographic demonstration. Encephalography, involuntary movements and gait.

The fee for this course is £4 4s. and entries should be in the hands of the Secretary, Post-Graduate Committee, College of Surgeons Building, Spring Street, Melbourne, C.1, by September 10. Medical officers who have been on full-time active service during the present war are exempt from these fees.

### Correspondence.

#### THE USE OF TRICHLOROETHYLENE IN ANÆSTHESIA.

SIR: I have just enjoyed reading Major Bridges Webb's paper in the journal of August 11, and I hasten to write these lines in the hope that they may save him from another of those periods of disgust to which he is apparently subject.

I have been fortunate enough to have had the opportunity of using trilene in over a thousand operations of a wide variety, most of this work having been done with an E.M.S. Rotameter pattern Boyle's apparatus, the trilene being used in the chloroform bottle. Latterly I have been using the "Austox" "D-M" gas apparatus with trilene in the ether vaporizer, and I think it is an advantage to have a second ether vaporizer fitted closely in series with the first so that trilene may be placed in the first bottle and ether in the second.

Premedication has always been "Omnopon", one-third of a grain, scopolamine, one one-hundred-and-fiftieth of a grain, given one and a half hours before operation and anaesthesia induced by a very small dose intravenously of a short-acting barbiturate (0.2 to 0.3 gramme of "Pentothal" is my choice) followed immediately by nitrous oxide. The addition of trilene may be made almost immediately, and in the vast majority of cases the patient is ready for the surgeon in a little less than the ten minutes mentioned by Major Bridges Webb. Excitement in the second stage is virtually unknown. If relaxation is required for the operation the addition of ether may be made quite early in the induction without any disturbance and the amount of ether required has been surprisingly small and usually only necessary for quite a short period.

It is my belief that all the difficulties in the administration of trilene arise from over-dosage, and it is only when it is realized that a very minimum of trilene both during induction and for maintenance will do everything that trilene can do that the difficulties disappear. It is best during induction to forget Hewer's dictum that the non-irritability of the drug makes the induction rapid and easy, for this thought in the mind tends to make the anaesthetist increase the concentration of the drug both too rapidly and too much. Only when this is borne in mind and restraint is practised will it become clear how true this dictum is.

In this series of patients, composed almost entirely of sailors who are, I imagine, just about as difficult subjects as soldiers, I have almost invariably found that there is really quite a wide plane of satisfactory anaesthesia obtainable before getting into the region where tachypnoea may readily occur, and in many cases I have found that this reaches well down into the second plane of the third stage. Apnoea has been troublesome on one or two occasions only and extrasystoles have occurred but rarely. Recovery has always been smooth with surprisingly little discomfort and delayed recovery has never been noted. It is regretted that at present my statistics are not readily available.

I feel sure that there is quite a wide field of use for this drug, and I hope that all Major Bridges Webb's days may be "trilene days" and that his disgust may soon be permanently displaced by enthusiasm, and in this I am sure his patients and ward sisters will share.

Yours, etc.,

MAURICE HOSFORD,  
Surgeon Lieutenant-Commander.  
Royal Naval Volunteer Reserve.

Royal Naval Hospital,  
Brisbane,  
August 20, 1945.

#### REPATRIATION DEPARTMENT AND EX-SERVICE PERSONNEL.

SIR: In your issue of November 25, 1944, you published a letter from me in which I spoke of a Royal Australian Air Force man who had suffered from pleurisy with effusion in 1942 and again in 1943, and who had been discharged from the service on account of "recurrent non-tuberculous pleurisy". He was receiving a pension of 7s. 6d. a week. I remarked that he seemed to be shaping for a breakdown from tuberculosis, and I criticized the policy of the Repatriation Department in refusing to accept a diagnosis of tuberculosis unless tubercle bacilli were demonstrated. This man is now laid low with caries of the spine and a para-

vertebral abscess. Definitely he has broken down from tuberculosis and a prolonged illness faces him. It is a pity that such things should happen.

In a letter published in your issue of December 30, 1944, Dr. Kenneth Smith, the Principal Medical Officer of the Repatriation Commission, took me to task. He said that it was not and had never been the policy of the Repatriation Department to insist on the demonstration of tubercle bacilli before arriving at a diagnosis of tuberculosis. If it is not the policy, it certainly is the practice commonly adopted and a practice that may lead to deplorable results, as it has in this case. Maybe Dr. Smith would care to modify the statements he made in his letter or perhaps to withdraw them altogether.

Yours, etc.,

D. R. W. COWAN.

163, North Terrace,  
Adelaide,  
August 20, 1945.

#### POVERTY, HOUSING AND HEALTH.

SIR: Mr. W. Oswald Burt, in his article in the journal of the eleventh instant, on the laudable subject, of which all medical practitioners will approve, of eliminating insanitary conditions, pauses a moment to "consider what preventive role the medical practitioner has played in the tragic sequence of poverty, bad housing and impaired health of the community" and quotes Dr. Dark, who, he writes, "may be . . . has pointed a new charter for the medical profession". Can you tell me why sociological preachers with political bent seem to love to hold up medical practitioners as examples of ineptitude or indolence quite regardless of the facts? The outlook of medical practitioners is not limited to vaccines and a bottle of medicine. Opening a book on clinical medicine published in 1914, I find the following factors mentioned in the aetiology of tuberculosis: (i) heredity; (ii) sex; (iii) malnutrition following deficient food, hyperlactation, exhausting diseases or acute specific fevers; (iv) unhealthy surroundings, including indoor occupations, a damp soil, faulty dwellings, the moist hot atmosphere of factories and the dust-laden atmosphere of certain occupations as stonemasonry; and (v) milk in the spread of the bovine type. In Edinburgh, more than thirty years ago, a physician established a tuberculosis dispensary from which a nurse visited the homes and investigated the social conditions of patients. His work was well known; in fact, he was knighted for it. If little political action has resulted, can medical practitioners be blamed for that? Politically, they are non-entities, having negligible voting strength. There existed overcrowding in towns and narrow streets and plagues before the beginning of the industrial era. When they increased during the industrial revolution, it required a degree of genius to conceive for the first time a relationship between living and working conditions on the one hand and morbidity and mortality on the other. It was easy for others to follow the trail. There should rather be praise for those with vision than blame for the mentally blind. Reform is slow and difficult; Mr. Burt may realize that before his housing scheme is finished.

Mr. Burt takes poverty as the point at which to begin his inquiry, thereby avoiding many awkward questions related to its causes. Then, by means of a few statistics, he sets out to prove the great poverty of the masses of our people. But the statistics he quotes for 1933 cannot be accepted as representative of normal conditions in Australia. He mentions that "during the depression years (1930 to 1936) there was a marked falling-off in the building of houses", and obviously in 1933 conditions were abnormally bad. He omits to mention unemployment; many unemployed, at least in this district, preferred to idle in town on the dole supplemented by charities rather than work on a farm. In dealing with 1943, when wages were probably at the maximum, he merely states that 85% of those paying income tax received less than £500 per annum. I do not consider a person receiving £499 per annum poor. Such statistics prove nothing claimed for them. Yet, on the assumption that they have proved his thesis, he poses the question "whether, in view of the poverty of our people, a contributory system of social security is feasible". I hold the view that any dole has a harmful effect on the character both of the individual and the nation, whereas the endeavour to pay for benefits has an elevating effect. Hardship could be avoided when wages are low by making the contribution a small percentage of the wage. Our aim should be to provide work for all, well paid for when well done. The go-slow policy adopted by workmen has, in my opinion, been the greatest deterrent to progress. It seems to me that there is a mathematical

relationship between the total effective work done and the standard of living in a community, and if the rate of work of all workmen is reduced to the level of the slowest workman, then a corresponding lower standard of living can be expected in spite of machinery. Attempts to improve the standard of living by raising wages under such conditions only result in gyrations that cause increasing inflation.

In the experiment quoted of the transfer of slum-dwellers to better but more costly houses and of their increased mortality, ascribed to poorer food necessitated by the higher rent, Mr. Burt omits to mention the numbers, so essential for validity where the laws of probability are invoked. It is more than likely in a small experiment that they were too few to justify comparison of mortality rates. It should have been easy in a small population like that to have obtained direct information about their dietary, thus eliminating surmise from the conclusion. No mention is made of self-help in the way of a vegetable plot or a poultry yard.

There is too much laxity in the application of statistics. Like medicine, they seem so easy and yet are so difficult to use scientifically. I wonder, too, if Mr. Burt realizes that taxation has a limit short of infinity.

Yours, etc.,

J. BROWN.

Toowoomba,  
Queensland,  
August 21, 1945.

#### Honours.

##### THE VENERABLE ORDER OF THE HOSPITAL OF SAINT JOHN OF JERUSALEM.

THE following notification has been received from the Secretary-General of the Venerable Order of the Hospital of Saint John of Jerusalem.

The Sub-Prior, acting on behalf of His Royal Highness the Grand Prior, has approved the following appointments in the Commandery of the Australian Commonwealth (exclusive of Western Australia) for the triennial period commencing Saint John's Day, June 24, 1945:

*Lieutenant:* Group Captain Hugh R. G. Poate, M.B., F.R.C.S.

*Director of Ambulance:* Colonel W. Vickers, D.S.O., V.D., M.B.

*Commandery Commissioner:* S. L. Dawkins, Esq., O.B.E., M.B.

*Treasurer:* J. Newman Morris, Esq., C.M.G., M.B.

*Director of Ceremonies:* T. H. Goddard, Esq., C.B.E., M.B.

#### Naval, Military and Air Force.

##### APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 158, of August 20, 1945.

##### CITIZEN NAVAL FORCES OF THE COMMONWEALTH.

###### Royal Australian Naval Reserve.

*Promotion.*—Acting Surgeon Lieutenant-Commander Edward Eric Keith Bottomley is promoted to the rank of Surgeon Lieutenant-Commander, dated 1st July, 1945.

*Transfer.*—Surgeon Lieutenant-Commander Donald Dunbar Coutts, D.S.O., is transferred to the Royal Australian Naval Volunteer Reserve, with seniority in rank of 15th October, 1934, dated 29th April, 1942.

###### Royal Australian Naval Volunteer Reserve.

*Promotion.*—Surgeon Lieutenant Ian Stephen MacLeod Murphy is promoted to the rank of Surgeon Lieutenant-Commander, dated 1st August, 1945.

*Termination of Appointment.*—The appointment of Donald Murray Logier Finlay as Surgeon Lieutenant is terminated, dated 14th June, 1945.

##### ROYAL AUSTRALIAN AIR FORCE.

###### Citizen Air Force: Medical Branch.

The probationary appointment of Flight Lieutenant J. P. Gallagher (267409) is confirmed with effect from 15th July, 1945.—(Ex. Min. No. 206—Approved 16th August, 1945.)



*Reserve: Medical Branch.*

Temporary Squadron Leader J. F. Frayne (281244) is transferred from the Active List at his own request with effect from 23rd June, 1945.

## CASUALTIES.

ACCORDING to the casualty list received on August 27, 1945, Major H. A. Sweetapple, A.A.M.C., Edgecliff, New South Wales, is now reported removed from the "seriously ill" list.

**Nominations and Elections.**

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Roberts, Walter McPherson, M.B., B.S., 1929 (Univ. Sydney) (Major, Australian Army Medical Corps), 16, Helen Street, Merewether.

THE undermentioned have been elected as members of the New South Wales Branch of the British Medical Association:

Anderson, Donald Edmund, provisional registration, 1945 (Univ. Sydney), Sydney Hospital, Sydney.

Early, Victor Maynard, M.B., B.S., 1944 (Univ. Sydney), 15, Muttama Road, Artarmon.

Arnold, Arthur William Porter, M.B., B.S., 1944 (Univ. Sydney), Lake Crescent, Teralba.

Cohen, Morris, M.B., B.S., 1944 (Univ. Sydney), Flight Lieutenant, 113, Station Street, Newtown.

D'Ammond, Phyllis Kathleen Annie, M.B., B.Sc., B.S., 1943 (Univ. Sydney), "Glencourse", Hazelbrook, New South Wales.

Davis, Neville Coleman, provisional registration, 1945 (Univ. Sydney), The Crescent, Pennant Hills.

Fisher, Elizabeth Mary Maxwell, M.B., B.S., 1944 (Univ. Sydney), Parramatta District Hospital, Parramatta.

Gibbons, Claude Lamb, M.B., B.S., 1940 (Univ. Sydney), Squadron Leader, No. 5, M.R.U., R.A.A.F., Victor Harbour, South Australia.

Hughes, Herbert Leslie, M.B., B.S., 1939 (Univ. Sydney), Captain, 115 (Heidelberg) Military Hospital, Heidelberg, Victoria.

Knight, Ronald Victor, provisional registration, 1945 (Univ. Sydney), Royal North Shore Hospital, St. Leonards.

Lehmann, Douglas Keith, M.B., B.S., 1945 (Univ. Sydney), Hornsby and District Hospital, Hornsby.

Lowe, Betty Marjorie, M.B., B.S., 1944 (Univ. Sydney), Eastern Suburbs Hospital, Bondi Junction.

MacMillan, Kenneth Charles (provisional registration), 1945 (Univ. Sydney), Sydney Hospital, Sydney.

McDonald, Geoffrey Lance, B.A., 1941, M.B., B.S., 1945 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

Nolan, Marcella Therese, M.B., B.S., 1945 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

O'Keeffe, Eva Florence, M.B., B.S., 1941 (Univ. Sydney), 86, Queenscliff Road, Manly.

Rimmer, William David, M.B., B.S., 1945 (Univ. Sydney), Royal North Shore Hospital, St. Leonards.

**Medical Appointments.**

Dr. R. T. Binns has been appointed Official Visitor at the Parkside Mental Hospital, South Australia.

Dr. H. R. Gilmore has been appointed Clinical Pathologist and Pathological Registrar at the Royal Adelaide Hospital, South Australia.

Dr. C. Richards has been appointed deputy member of the Medical Board of New South Wales, being nominated by the mine owners in pursuance to the provisions of section 8 of the *Workmen's Compensation (Broken Hill) Act, 1920-1945*.

Dr. R. F. May and Dr. C. H. Hembrow have been appointed members of the Masseurs Registration Board, Victoria, until June 30, 1948, pursuant to the provisions of Section 4 of the *Masseurs Registration Act, 1928*.

Dr. H. T. Illingworth has been appointed Medical Officer of Health for the Bruce Rock Road Board, Western Australia.

**Diary for the Month.**

- SEPT. 4.—New South Wales Branch, B.M.A.: Organization and Science Committee.  
 SEPT. 5.—Western Australian Branch, B.M.A.: Council Meeting.  
 SEPT. 5.—Victorian Branch, B.M.A.: Branch Meeting.  
 SEPT. 6.—New South Wales Branch, B.M.A.: Special Groups Committee.  
 SEPT. 6.—South Australian Branch, B.M.A.: Council Meeting.  
 SEPT. 7.—Queensland Branch, B.M.A.: Branch Meeting (Jackson Lecture).  
 SEPT. 11.—New South Wales Branch, B.M.A.: Executive and Finance Committee.  
 SEPT. 11.—Tasmanian Branch, B.M.A.: Ordinary Meeting.  
 SEPT. 14.—Queensland Branch, B.M.A.: Council Meeting.  
 SEPT. 17.—Victorian Branch, B.M.A.: Hospital Subcommittee.  
 SEPT. 17.—Victorian Branch, B.M.A.: Finance, House and Library Subcommittee.  
 SEPT. 18.—Victorian Branch, B.M.A.: Organization Subcommittee.  
 SEPT. 18.—New South Wales Branch, B.M.A.: Medical Politics Committee.  
 SEPT. 19.—Western Australian Branch, B.M.A.: General Meeting.  
 SEPT. 20.—South Australian Branch, B.M.A.: Council Meeting.  
 SEPT. 20.—Victorian Branch, B.M.A.: Executive Meeting.  
 SEPT. 20.—New South Wales Branch, B.M.A.: Clinical Meeting.

**Medical Appointments: Important Notice.**

MEDICAL PRACTITIONERS are requested not to apply for an appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

**New South Wales Branch** (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmah United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phoenix Mutual Provident Society.

**Victorian Branch** (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

**Queensland Branch** (Honorary Secretary, B.M.A. House, 235 Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

**South Australian Branch** (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

**Western Australian Branch** (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract practice appointments in Western Australia. All Public Health Department appointments.

**Editorial Notices.**

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary is stated.

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